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Established by Edward L. Youmans

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MONTHLY**

EDITED BY
WILLIAM JAY YOUMANS

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MARCH, 1899.

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CLÉMENCE ROYER.

APPLETONS' POPULAR SCIENCE MONTHLY.

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MARCH, 1899.

THE EVOLUTION OF COLONIES.

By JAMES COLLIER.

VII.—SOCIAL EVOLUTION.

Perhaps there is no civilized institution to which, man has accommodated himself with so ill a grace as monogamy. Hardly a perversion of it has ever existed but may still be found. Polygamy is widely spread in the most advanced communities; temporary polyandrous *ménages à trois* are known to exist elsewhere than among the Nairs and Tibetans and *ancient* Britons; the matriarchate in one shape or another may be detected well outside the sixty peoples among whom Mr. Tylor has discovered it; and marriage by free choice is far from having superseded marriage by capture or by purchase. It is the less surprising that abnormal or ancient forms of the union should have been revived in colonies. In this relationship, as in most others, the colonist, like the sperm cell after its junction with the germ cell, sinks at once to a lower level, and the race has to begin life over again. The fall is inevitable. The earliest immigrants are all of them men. Everywhere finding indigenes in the newly settled country, they can usually count on the complaisance or the submissiveness of the tribesmen. Native women have a strange fascination for civilized men, even for those who have been intimate with the European aristocracies and have belonged to them. Adventurous Castins might find their account in a relationship that was in perfect keeping with the wild life they led. It is more strange that, enslaved by an appetite which sometimes rose to a collective if seldom to a personal passion, educated men, with a scientific or a public career flung open to them at their option, able men who have written the best books about the races they knew only too well, men of great position whose heroic deeds and winning manners made them adored by women of their own race, should have spoiled their prime, or inextricably entangled themselves, or wrecked their own roof-tree and incurred lifelong desertion by the wife of their youth. The bluest blood of Spain was not contaminated by an alliance with the Incas, but just ten years ago the direct line of an ancient English earldom was extinguished among the Kaffirs. The truth seems to be that while a woman will not as a rule accept a man who is her inferior in rank or refinement, a man easily contents himself for the time with almost any female. The Bantu woman and the Australian *zundra* are not alluring, but they have never lacked suitors. Colonial women shrink (or profess to shrink) from the Chinaman; all colors—black, brown, red, and yellow—seem to be alike to the indiscriminating male appetite. Yet it has its preferences. The high official who stands unmoved before the cloudy attractions of the Zulu, surrenders at discretion to the soft-voiced, dark-eyed, plump-limbed daughters of Maoriland. In the last case a perverse theory (of the future amalgamation of the races) may have been "the light that led astray"; it certainly was used to justify their acts to the consciences of the doers. Romance had its share: Browning's Waring (who was premier as well as poet) threw a poetic glamour over the miscegenation, as another minister found in the race the Ossianesque attributes of his own Highlanders. It sometimes, even now, rises into passion: the colonial schoolmaster who marries a native girl will declare that his is a love match. But the chief reason at all times was "the custom of the country." "It was the regular thing," remarked an old legislator, looking ruefully back on his past. Nor is it to be harshly censured. Corresponding to the Roman slave-concubinage which Cato Major did not disdain to practice, it repeated a stage in the history of the mother country when the invading Angles allied themselves (as anthropology abundantly proves) with the native Britons. While making a kind of atonement to the indigenes, it was a solatium to the pioneer colonists for a life of hardship and privation.

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A higher grade was the concubinage of convictism, which was with women of the same race and was capable of rising into normal marriage. In the early days of New South Wales and Van Diemen's Land it seems to have been almost universal, and it lasted for many years. Not one in ten of the officials lived with his legally married wife. In the latter colony it was suppressed by the governor, who ordered them to marry the women by whom they had families. In the former, if Dr. Lang's account of his exertions is accepted, it was put down by the exposure of guilty parties. It was accompanied by other features of a low social state. The public and private sale of wives was not infrequent. The colonial equivalent for a wife, in the currency of those days, was sometimes four gallons of rum, or five pounds sterling and a gallon, or twenty sheep and a gallon; one woman was sold for fifty sheep.

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Around gold and silver mining encampments nondescript relationships of a slightly higher order arise. They are with free women, though the women are apt to be of the same class as Bret Harte's Duchess of Poker Flat, answering to the Doll Tearsheets of hardly more civilized communities. They often issue in marriage. In mining townships, and even in colonial towns, professional men are to be found married to unpresentable women.

In colonies of regular foundation normal marriages are contracted under difficulties. Few women at first go out, the emigrants intending to return when they have made their fortune. Women have accordingly to be sent. In the seventeenth century a number of girls of good repute were persuaded to emigrate to Virginia, a subscription being raised to defray the cost. In the following century wives were sent to settlers in French Louisiana on the same plan. To French Canada women were dispatched by shiploads. They were selected (according to Parkman) as butchers choose cattle: the plumpest were preferred, because they could stand the winter best and would stay at home. In Virginia women were offered for sale to eager colonists, who willingly paid one hundred pounds of tobacco for one, or as much as one hundred and fifty pounds for a very pretty

girl; a debt incurred for the purchase of a wife being considered a debt of honor. In the early days of Canterbury, New Zealand, when a consignment of servant girls arrived, young farmers would ride over the Port hills and carry them off, though in the style rather of young Lochinvar than of the Sabine rape. Settlers have often requested the agent general for the colony or the mayor of their native town to send them out a wife. Wives so easily acquired are apt to be lightly parted with, and within the last few years, in colonial villages, amicable exchanges have been effected—one woman going with her children to the house of another man, whose wife and children made a reciprocal migration. Facts such as these (which might readily be multiplied) show how easily so-called civilized man sloughs off the conventions of ages and sinks to a primitive level. They soon disappear, however, and social colonial conditions rapidly assimilate themselves to those of the mother country. In most young colonies marriage is universal and it is early. After a few days' acquaintance couples rashly engage themselves, in utter ignorance of one another's character or of their own, and a precipitate marriage follows, with such results as might be expected. Statistics show that the age of marriage on the part of women is steadily rising. In the early days of each colony a girl was deemed *passée* if she did not get married before she was twenty-one. In the decade that ended the first century of New South Wales the proportion of married women under that age fell from 28.17 to 23.55 per cent; in less prosperous Victoria, after only half a century, it fell from 21 to 17.4; in New Zealand there was a big drop from 29.4 to 19.7. The proportion of married women under twenty-five has also seriously declined. The decrease is noticeably correspondent with the increased number of young women who are gaining their own livelihood—largely as teachers and typewriters. On these lines the colonies are following the lead of the mother country. Long engagements, followed by late marriages with fewer children, take the place of short engagements with hasty marriages and larger families. Female celibacy is no longer dishonorable, and women are beginning to understand that they may be far happier single and self-supporting. The quality of marriage improves with its rarity. When an Australian M. A. marries an M. A., or the most brilliant of New Zealand professors marries one of his most distinguished students, we feel, as when a Dilke marries a Pattison, that the ideal of the union has been realized.

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The growth of the colonial house follows the development of the family and repeats the history of the race. The immigrant procures his abode, as he afterward buys his clothes, ready made. The ancient troglodyte lives to-day in the Derbyshire cave dweller; the original Romanist settlers of Maryland were driven to take refuge in cave houses in Virginia; and the New Zealand hermit, like "great Pæan's son" at Lemnos, "weeps o'er his wound" of the heart in a cave by the resounding sea. Where they can not be found ready dug they can be excavated, as they were by some early Pennsylvania colonists. Others in Virginia, New York, and New England found it easier to dig holes in the ground, thus imitating the Germans of Tacitus, whose winter residences are also repeated in those basements which form the wholesome abode of the London domestic servant. The wattle-and-daub house of the Anglo-Saxon villager has been everywhere reproduced in the colonies, and may still be abundantly found.

If the occupation of caves and the burrowing of holes suggests man's distant affinity to the carnivora and lower quadrupeds, his simian origin is confirmed by the use he makes of the tree. In the infant city of Philadelphia there were "few mansions but hollow trees." A rude form of tent is the next stage, the canvas consisting (as may still be seen among the poorer campers-out) of clothes or rags. Then, as in the early days of Sydney, the tents were covered in with bushes and thatched over. Next (as may to-day be observed in the neighborhood of Coolgardie) a framework of branches is employed to support the canvas, and the tent is converted into a cabin. A stride toward the house is taken when the branches are replaced by a regular woodwork, with doors and windows; the envelope being still sometimes canvas, which is soon replaced by corrugated iron. The Brazilian country house where Darwin lodged sixty years ago was built of upright posts with interwoven boughs. Another line of development starts from the trunk of the tree. The early American colonists made bark wigwams. The Australian pastoralist "erected a temporary house, generally of large sheets of bark, in the first instance." In countries where the winter is more severe or the bark less substantial, the backwoodsman builds, as the early colonist built, a rude cabin of round logs. Then the logs are hewn, or they are split or sawn into planks, and built into the weatherboard houses still common in the rural parts of Australia, and general even in New Zealand towns. In their earliest stages they are still without a floor and are roofed with thatch or shingle. Towns often thus remain like early Sydney, "a mere assemblage of paltry erections intermediate between the hut and the house." The architecture is of the simplest. A "butt" and a "ben," with a "lean-to," form the prevailing type. As the family grows or its wealth increases, new portions are added, till many colonial houses look for all the world as if they had "come out in penny numbers." Even with a few stately structures—luxurious mansions, extensive government offices, Gothic parliamentary buildings—a wooden city has an indefinable meanness of appearance. It is improved out of existence by the dread agency of fire. Like Charles's London, New Orleans and many another colonial town have thus had an Augustan renewal. Houses are now built of brick, stone, or concrete; tile, slate, and iron replaced thatch and shingle; two stories were ventured on; chimneys were smaller but safer. They became susceptible of architecture: Spanish features were introduced into those of New Orleans; the more northern colonies copied the English country house, with modifications to suit the hotter or colder climate; and in New South Wales a taste for mansion-building came into vogue along with splendid equipages, liveried servants, and pedigrees. Such houses were at first arranged in all degrees of irregularity and confusion. The street is a modern invention. The cows returning from pasture laid out Boston, and the bullock teams climbing up from the harbor charted Sydney. Towns in manufactured colonies, as Savannah, Augusta, most South American cities, Christchurch and Invercargill in

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New Zealand, were planned before settlement and have their streets at right angles.

A hundred years ago Talleyrand, exiled in the United States, described the journey from one of these cities to the interior as successively exhibiting all past stages of the human habitation from the mansion to the tent, and just a century later one of Talleyrand's countrymen, M. Pierre Leroy-Beaulieu, traveling in the reverse direction, from "the bush" to Coolgardie, witnessed the gradual transformation of the tent into the two-storied hotel. A great part of the history of the race in the matter of habitations is thus museumed in the space of a few miles.

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If the temple rises out of the tomb, is modeled on that, and remains to the last pre-eminently a place of sacrifice, the church is an enlarged dwelling house. It is the house of the god, as the fetishist called it—the house of God, as we still reverently call it; and in Romanist countries to this day it is in a manner the abode of two divine personages, who figure as dized and painted dolls that are named respectively God and the Mother of God! Both lines of development are rapidly recapitulated in colonies. The temple appears as the cathedral, which has modest beginnings, but gradually assumes the architecture and proportions of Gothic cathedrals, losing relation to the primary wants of the worshipers—comfort and audibility—ministering mainly to their higher needs, and if used for preaching at all, reserved for such occasional and sensational pulpit oratory as that of Dominican monks like Lacordaire at Notre Dame in Paris, or of a Protestant Dominican like the late Canon Liddon at St. Paul's in London. The church, chapel, or meeting house may be found in colonial villages in its most rudimentary form, scarcely distinguishable in style from a dwelling house. According to the sect it belongs to, it develops in one of two opposite directions. The age of cathedrals is past, even in Roman Catholic countries, but the tendency of Anglican and allied churches is to simulate the old cathedral; high ritualistic sections mimic the gorgeous Madeleine. The more liberal denominations, on the other hand, develop downward; the colonial Baptist tabernacle is on the lines of Spurgeon's great building at Newington, but the ancient pulpit is widened into a platform and the seats slope upward as in a concert hall; it is a mere auditorium, in which the preacher is all. The development in this direction finds its extreme in the secularist hall, which is a mere concert room, with a piano in place of an organ. The ceremonial development is on the same lines—toward the gradual adoption of ancient rites by the older churches, toward more freedom in the younger sects. Many a colonial clergyman has wrecked himself or his congregation through too much ritualism; a few have injured themselves through an excess of liberalism.

A parallel evolution takes place in church government. Where an organized settlement is made on political principles, congregations carry their minister with them, or rather the ministers carry their congregations. Where the colony is normally founded and grows up as the mother country grew, the first ministers, like the first preachers of Christianity itself, are often laymen. In an interior county of Virginia Morris read every Lord's day to his neighbors from the writings of Luther and Bunyan, and a meeting house was at length built for him; it is a typical instance of the beginnings of most churches. The part of laymen remains long prominent in colonies. The Anglican lay reader is everywhere a feature of colonial church life. In the more flexible churches a storekeeper or retired sea captain will read Spurgeon's sermons or preach excellent sermons of his own in an Otago village or the Australian bush. Where missionaries have been sent out to convert the heathen in a country afterward colonized, many of them remain as ministers, as did Augustin and his monks in England. The Presbyterian catechist likewise becomes a settled minister. Others arrive. Men of independent character, like Dr. Lang, of Sydney, resolve not to wait for any dead man's shoes in the kirk, but sail beyond the seas to colonies where there is no minister of their own denomination. Heretics, incompatibles, men who have failed, men whose health has given way, emigrate in increasing numbers. Still, the supply is long deficient. Clergymen were scarce in New York. A bounty was offered to immigrants in Virginia. Six years after the establishment of the Church of England in North Carolina there was only one clergyman in the country. The few there are repeat the history of the first Christian bishops and the early English monks in serving a circuit of two, three, or more churches. The state comes to the rescue by providing for their support. In England contributions were at first voluntary; by the eighth century tithes were levied, folk-land was granted, and private endowments were made. Just so was the Church of England established and endowed in New York, Virginia, and North Carolina; in Maryland a poll tax of forty pounds of tobacco was levied for its support. In Connecticut and Massachusetts a church was set up in each parish on Congregationalist principles by a vote of the people, who elected the minister and voted his salary. So uncertain was the tenure that in several States even the Anglican minister was hired from year to year; and quite lately an Anglican church in a British colony engaged its incumbent, as it might have engaged its organist, for a term. In 1791 the Church of England in Canada was partially established, and its clergy endowed with grants of land. The Australasian colonies have pursued a very various policy. By the Constitution Act of 1791 one seventh of the ungranted lands in New South Wales was set apart for the support of a Protestant clergy. An attempt to endow the Anglican Church in South Australia in the early forties was defeated by a radical governor. A recrudescence of the ecclesiastical principle permitted the church settlements of Otago and Canterbury in New Zealand to appropriate a portion of the funds derived from the sale of lands for the endowment of the Presbyterian and Anglican churches respectively. So far the colonies followed, latterly with halting steps, the history of the mother country. As in political, so in ecclesiastical government, they have anticipated that history. The American state churches did not survive the Revolution. In Canada the Presbyterians and other sects successfully asserted their claims to a share in the church endowments, which between 1840 and 1853 were distributed among the municipalities, all semblance of a connection between church and state being thus destroyed. New South Wales passed through a period of religious equality with concurrent endowment of the four most

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numerous denominations, and a long struggle against the principle of establishment was ended in 1879, when the reserves were devoted to the purposes of education. The practice of confiscating for the church a portion of the proceeds of the land sales was gradually dropped in Otago and Canterbury, probably more for commercial reasons than in consequence of the opposition of the democratic governor aforesaid, who spoked the wheel of the South Australians. Yielding to Nonconformist pressure, the liberal Government in 1869 enforced the principle of religious equality throughout the crown colonies, which were thus, willingly or not, made to follow the lead of the movement in Ireland. The internal organization of the colonial church is also anticipative. Fifty-two years ago Sir George Grey bestowed on the Anglican Church in New Zealand, then governed by him, a constitution modeled on that of the corresponding church in the United States, as the political constitution he drafted for the colony was modeled on the Constitution of the United States; and it has been imitated in other Australasian colonies, which have thus declared themselves independent of the mother church, while the colony is still politically dependent on the mother country. In yet another point the daughters have outstripped the parent. Three Presbyterian denominations still fissure the old home of Presbyterianism; only two have ever existed in the colonies, and for thirty years these two have been one. The four chief Methodist sects in Australia are also said to be on the point of amalgamating.

The development of doctrine runs a fourth parallel to those of buildings, cult, and organization, and in a brief space it recapitulates a long history. In early colonial communities religious dogma is found in a state of "albuminous simplicity." "A healthy man," says Thoreau, "with steady employment, as wood-chopping at fifty cents a cord, and a camp in the woods, will not be a good subject for Christianity." Nor will a bush-faller, at twenty-five shillings the acre. Distant from a church and a minister, he gets out of the way of attending the rare services brought within his reach, and forgets the religion in which he was nurtured. It does not mingle with his life. He is usually married at a registrar's. His children are unbaptized. His parents die unshriven. The dull crises of his mean existence come and go, and religion stands dumb before them. The inner spiritual realities fade from his view as their outward symbols disappear, and bit by bit the whole theological vesture woven by nineteen Christian centuries drops off him like Rip Van Winkle's rotten garments when he woke from his long sleep. In the matter of religion, as in almost all else, the colonist has to begin life again poor.

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As population grows and people come nearer to one another, two things happen. The churches push their skirmishers into the interior, plant stations, and have regular services. Gradually the old doctrines strike root in the new soil, and at length a creed answering to Evangelicalism is commonly held, thus repeating the first stage in the history of Christianity in Asia as in England. On the other hand, many of those whom neglect had softened into indifference or hardened into contempt assume a more decided attitude. With the spirit of independence which colonial life so readily begets, and stimulated by the skeptical literature of the day, they take ground against the renascent religion. Secularism, which denies what Evangelicalism affirms and is on a level with that, is born. It organizes itself, has halls and Sunday meetings, catechisms and children's teaching, newspapers, and a propaganda. For a while it is triumphant, openly contemptuous of the current religious mythology, and menacing toward its exponents. The Secularist leaders make their way to the bench and the legislature, the cabinet and the premiership. It is here the hitch arises. Some (by no means all) of these leaders are found to prefer power to principle, and prudently let their secularism go by the board when a wave of popular odium threatens to swamp the ship. Financial distress spreads. The movement loses *éclat*. As Bradlaugh's Hall of Science in London has been sold to the Salvation Army, the Freethought Hall in Sydney has been purchased by the Methodists, and in other colonial towns the cause has collapsed. But it always remains, whether patent or latent, as a needed counterpoise to the crudities of Evangelicalism, and it is the core of that increasing mass of religious indifferentism which strikes those who have been brought up in the old country. Statistics are said to prove that Australia is more addicted to church-going than England. If they prove any such thing, then statistics (as Mr. Bumble irreverently said of the British Constitution) are hassles and hidiots. You may sit down on any Sunday morning at a colonial table with a dozen highly respectable persons of both sexes and all ages, not one of whom has any thought of going to church that day. Such an experience would be impossible in England. The mistake has arisen from comparing England as a whole, which has classes below the line of church-going or indeed of civilization, with Australia as a whole, where such classes hardly exist. Compare Australia in this respect with the English middle classes, and the fallacy will be manifest.

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When a colony has hived off from the parent state at a time of religious excitement, and especially when it has religion for its *raison d'être*, it starts fully equipped on lines of its own, the earlier naturalistic stages being dropped. English theology and Puritan religion emigrated to North America in the seventeenth century, and there for two centuries they for the most part remained. Ever since, in New England and the States of the middle belt, religion has played the same high part as it did in old England under Oliver. There has, therefore, been a theological development in the United States to which, till fifty years ago, there was no antecedent parallel in the mother country. While it has produced no theologian or pulpit orator of the first rank—no Calvin, but only Jonathan Edwards; no Bossuet or Chalmers, but only Channing and Beecher—its theological literature compares favorably with that of England during the same period, and its preachers are acknowledged to be the best in Christendom. States and colonies that have grown up more normally get at length on the same lines, and as they put on civilization the tendency is to adopt ever more of the dogmatic system long inseparable from it. By a well-understood sociological law it generates its contradictory and corrective, and there springs up a higher type of denial than secularism—what Huxley felicitously named Agnosticism—the position of those

who know nothing about the matters which theological dogma defines, not the position of those who say that nothing can be known. As the Evangelical develops into the High Churchman and he into the Catholic, the Secularist refines into the Agnostic and rarefies into the Unknowabilist.

The literature of colonies is at first theological, as the literature of all countries is at first hieratic; the priest alone can write. But it is long before the stage of original production is reached, and books have to be imported before they can be written. The daughter must go to school with the mother, who supplies her with hornbooks. The continuity of the spiritual germ-plasm is insured by the transmission of books. Rome was thus initiated by Greece in every theoretical branch of knowledge. Rome thus educated early Europe. Chests of manuscripts from Thessalonica, Byzantium, and Crete were the precursors of the Renaissance. Books brought by Benedict to England formed the first English library. So is it long with all new countries. To this day the book circulation of the United States is largely English; in contemporary colonies it is overwhelmingly English, almost wholly Spanish, exclusively French or Dutch. The second stage also repeats the literary history of the mother countries. Colonial literature is a prolongation of the parental literature and is at first commentative and imitative of that. In a school at Canterbury founded by two foreign monks English written literature took its birth. The literature of mediæval Europe was a continuation of Roman literature. This stage may last long. Seventy or eighty years after the Declaration of Independence the literature of New England was still English literature of a subtler strain—perhaps lacking the strength of the old home-brew, but with a finer flavor. Naturally, in far younger Australia even popular poetry is still imitative—the hand is that of Gordon or of Kendall, but the voice is Swinburne's. The beginnings of a truly national literature are humble. They are never scholastic, but always popular. As chap-books, ballads, and songs were the sources of the æsthetic literature of modern Europe, the beginnings of general literature in the United States have been traced to the old almanacs which, besides medical recipes and advice to the farmer, contained some of the best productions of American authors. It is further evidence of the popular origin of native literature that some of its early specimens are works of humor. The most distinctive work of early Canadian and American authors is humorous, from Sam Slick to —; but it would be rash to say *who* is the last avatar of the genius of humor. If an alien may say so without offense, Walt Whitman's poems, with their profound intuitions and artless metre, seem to be the start of a new æsthetic, and recall ancient Beowulf. Australian literature, after a much shorter apprenticeship, has lately, in both fiction and verse, again of a popular character, made a new departure that is instinct with life and grace and full of promise.

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Literature and art have no independent value, but are merely the phonographic record of mental states, and would practically cease to exist (as they did during the middle ages) if these disappeared. The grand achievement of new, as of old, countries is man-making, and every colony creates a new variety. The chief agent is natural selection, of which the seamy side appears in vicissitudes of fortune. Here again the law prevails. These recapitulate those vicissitudes in early European societies which make picturesque the pages of Gregory of Tours. There are the same sudden rises, giddy prosperities, and inevitable falls. In the simple communities of ancient Greece the distance between antecedent and consequent was short, and the course of causation plain. Hence in myth and legend, in early historians like Herodotus, early poets like Pindar, early dramatists like Æschylus, we find a deep sense of the fateful working of the laws of life. The history of colonies is a sermon on the same text. Goodness is speedily rewarded; retribution no longer limps *claudo pede*, like Vulcan, but flies like Mercury with winged feet. In Europe a high-handed wrongdoer like Napoleon may pursue his career unchecked for fifteen years, or a high-handed rightdoer like Bismarck for five-and-twenty years; a would-be colonial Bismarck or Napoleon is commonly laid by the heels in the short duration of a colonial parliament. The vision of providential government, or the reign of law, in old countries is hard, because its course is long and intricate; in a colony it is so comparatively simple that all may understand it and find it (as Carlyle found it) "worthy of horror and worship." From witnessing the ending of a world Augustine constructed a theodicy, and so justified the ways of God to man. We may discover in the beginnings of a world materials for a cosmodycy which shall exhibit the self-operating justice inherent in the laws of the universe.

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POLITICS AS A FORM OF CIVIL WAR.

By FRANKLIN SMITH.

Why is it that, in spite of exhortation and execration, the disinclination of people in all the great democracies of the world to take part in politics is becoming greater and greater? Why is it that persons of fine character, scholarly tastes, and noble aims, in particular, seek in other ways than association and co-operation with politicians to better the lot of their fellows? Why is it, finally, that with the enormous extension of political rights and privileges during the past fifty years, there has occurred a social, political, and industrial degeneration that fills with alarm the thoughtful minds of all countries? Aside from the demoralization due to the destructive wars fought since the Crimean, the answer to these questions is to be found in the fact that at bottom politics is a form of civil war, that politicians are a species of *condottieri*, and that to both may be traced all the ethics and evils of a state of chronic war itself. In the light of this truth, never so glaring as at present in the United States, the peril to civilization is divested of mystery; it is the peril that always flows from anarchy, and the refusal of enlightened men to-day to engage in politics is as natural as the refusal of enlightened men in other days to become brigands.

The analogy between war and politics is not new. The very language in common use implies it. When people speak of "leaders," "rank and file," "party loyalty," "campaigns," "spoils of victory," etc., which figure so conspicuously and incessantly in political discussion, there is only a fit appropriation of the militant terms invented by one set of fighters to describe with vividness and precision the conduct of another set. What is new about the matter is the failure of thoughtful persons to perceive and to act upon their perception that in politics, as in war, vast economic, social, and political evils are involved. To be sure, lives are not often sacrificed, as in a battle, nor property destroyed, as in a siege or an invasion. But even here the analogy is not imperfect. Political riots have occurred that have brought out as completely as any struggle over a redoubt or barricade the savage traits of human nature. People were maimed and killed, and houses wrecked and burned. Especially was that the case in this country during the antislavery struggle and the period of reconstruction. Even in these days of more calm, political contests as fatal as the Ross-Shea *émeute* in Troy are reported from time to time. Owing, however, to the advance in civilization since the sack of Antwerp and the siege of Saragossa, the devastation wrought by political warfare has assumed forms less deplorable. But in the long run they will be found to be just as fatal to everything that constitutes civilization, and just as productive of everything that constitutes barbarism. "Lawless ruffianism," says Carl Schurz, pointing out in his *Life of Henry Clay* the demoralizing effects of the fierce political struggles during Jackson's administrations, "has perhaps never been so rampant in this country as in those days. 'Many of the people of the United States are out of joint,' wrote Niles in August, 1835. 'A spirit of riot and a disposition to "take the law in their own hand" prevails in every quarter.' Mobs, riots, burnings, lynchings, shootings, tarrings, duels, and all sorts of violent excesses, perpetrated by all sorts of persons upon all sorts of occasions, seemed to be the order of the day.... Alarmingly great was the number of people who appeared to believe that they had the right to put down by force and violence all who displeased them by act or speech or belief in politics, or religion, or business, or in social life." It is only familiarity with such fruits of violent political activity, only a vision impaired by preconceived notions of the nature of politics, that blinds the public to their existence.

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To see why politics must be regarded as a form of civil war rather than as a method of business, as a system of spoliation rather than as a science to be studied in the public schools,^[1] it is but needful to grasp the fundamental purpose of government as generally understood. It is not too much to say that nothing in sociology is regarded as more indicative of an unsound mind or of a mean and selfish disposition than the conception of government as a power designed to prevent aggression at home and abroad. Such a conception has been contemptuously called "the police conception." "Who would ever fight or die for a policeman?" cried an opponent of it, trying to reduce an adversary to ignominious silence. It was not sufficient to reply with the counter question, "Who would not die for justice?" and thus expose the fallacy of the crushing interrogation. "No one," came the retort, "could care for a country that only protected him against swindlers, robbers, and murderers. To merit his allegiance and to fire his devotion, she must do more than that; she must help to make his life easier, pleasanter, and nobler." Accordingly, the Government undertakes for him a thousand duties that it has no business with. It builds schools and asylums for him; it protects him against disease, and, if needful, furnishes him with physicians and medicines; it sees that he has good beef and pork, pure milk, and sound fruit; it refuses to permit him to drink what he pleases, though it be only the cheaper grades of tea, nor to eat chemical substitutes for butter and cheese, except they bear authorized marks; it transports his mails, supplies him with garden seeds, instructs him in the care of fowls, cattle, and horses, shows him how to build roads, and tells him what the weather will be; it insures him not only against incompetent plumbers, barbers, undertakers, horseshoers, accountants, and physicians, but also against the competition of the pauper labor of foreign countries; it creates innumerable offices and commissions to look after the management of his affairs, particularly to stand between him and the "rapacity" of the corporations organized to supply the necessaries of life at the lowest cost; it builds fleets of cruisers and vast coast fortifications to frighten away enemies that never think of assailing him, and to inspire them with the same respect for "the flag" that he is supposed to feel. Indeed, there is hardly a thing, except simple justice, cheap and speedy, that it does not provide to fill him with a love of his country, and to make him ready to immolate himself upon her altars.

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But I can not repeat with too much emphasis that every expenditure beyond that required to maintain order and to enforce justice, and every limitation of freedom beyond that needful to preserve equal freedom, is an aggression. In no wise except in method does it differ from the aggressions of war. In war the property of an enemy is taken or destroyed without his consent. In case of his capture his conduct is shaped in disregard of his wishes. The seizure of a citizen's property in the form of taxes for a purpose that he does not approve, and the regulation of any part of his conduct not violative of the rights of his neighbors, are precisely the same. If he is forbidden to carry the mails and thus earn a living, his freedom is restricted. If he can patronize no letter carrier but the Government, to which he must pay a certain rate, no matter how excessive, he has to a degree become a slave. The same is true if he can not employ whomever he pleases to cut his hair, or to fix his plumbing, or to prescribe for his health. Still truer is it if he is obliged to contribute to a system of public education which he condemns, or to public charities which he knows to be schools of pauperism, or to any institution or enterprise that voluntary effort does not sustain. In whatever way the Government may pounce upon him to force him to work for some one besides himself and to square his conduct with notions not his own, he is still a victim of aggression, and the aggression is none the less real and demoralizing because it is not committed amid the roar of cannon and the groans of the dying.

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To what extent the American people have become victims of this kind of aggression can not be determined with precision. Still, an idea may be had from the volume of laws enacted at every legislative session, and the amount of money appropriated to enforce them. A commonplace little appreciated is that every one of them, no matter what its ostensible object, either restricts or contributes to individual freedom. The examination of any statute-book will soon make painfully apparent the melancholy fact that the protection of individual freedom figures to the smallest extent in the considerations of the wise and benevolent legislator. Of the eight hundred enactments of the Legislature of the State of New York in 1897, for example, I could find only fifty-eight that had this supreme object in view. If we apply the same ratio to the work of all the legislatures of the country, and, allowing for biennial sessions, make it cover a period of two years—namely, 1896 and 1897—the astonishing result will be that, of the 14,718 laws passed, all but 1,030 aim, not to the liberation but to the enslavement of the individual. But to this restrictive legislation must be added the thousands of acts and ordinances of town, city, and county legislatures that are more destructive of freedom even than the State and Federal legislation. If not more numerous, they are certainly more minute, meddlesome, and exasperating.

As to the amount of plunder passing through the hands of the modern *condottieri*, that is susceptible of an estimate much more accurate. If we take the expenditures of all the governments of the United States, Federal, State, municipal, county, and town, for a similar period of two years, they reach the enormous total of two billion dollars, equal to more than two thirds of the national debt at the close of the civil war.^[2] Of this sum only about one hundred and twenty million dollars, or six per cent, are devoted to the legitimate functions of government—namely, the maintenance of police and courts—and one hundred and forty million dollars to the support of the military establishment.^[3] All the rest is expenditure that should no more be intrusted to the Government—that is, subject to the application of political instead of business methods—than the expenditure of a household, or a farm, or a cotton mill, or an iron foundry. Even if it were a legitimate expenditure of the Government, it could not be collected nor expended without injustice. Tax laws have never been and never will be framed that will not permit some one to escape his share of the burdens of the community; and the heavier those burdens are, as they are constantly becoming to an alarming degree, the more desperate will be the effort to shirk them—the more lightly will they rest upon the dishonest and unworthy, and the more heavily upon the honest and worthy. Moreover, it has never been possible, and it never will be possible, to expend money by political methods without either waste or fraud, and most usually without both.

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Such a volume of legislation and taxation permits of the easy detection of the vital difference between the theory and practice of politics. According to the text-books and professors, politics is the science of government. In countries like the United States, where popular institutions prevail, the purpose of its study is the discovery and the application of the methods that shall enable all citizens, rich and poor, to share alike in the inestimable privilege of saying what laws they shall have, and bear in proportion to their means the burdens it entails. Such a privilege is supposed to confer innumerable benefits. Every one is assured of scrupulous justice. He is made to feel profound gratitude for his happy deliverance from the odious tyranny and discrimination of a monarchy or an aristocracy. The participation of everybody in the important and beneficent work of government possesses a rare educational value. It leads the ignorant and indifferent to take a deep interest in public questions, and to attempt, as their strength and ability allow, the promotion of the welfare of their beloved country. Thus they escape the deplorable fate of burial in the sordid and selfish pursuit of their own affairs, and the consequent dwarfing of their minds and emotions. Rising to broader views of life and duty, they become patriots, statesmen, and philanthropists.

Enchanting as this picture is, one that can be found in the speeches of every demagogue, male and female, as well as in the works of every political philosopher of the orthodox faith, it has no sanction in the practice of politics. As long as the greater part of legislation and taxation has nothing whatever to do with government, properly speaking, politics can have no kinship with any pursuit held in esteem by men truly civilized. What it consists of may be reduced to a desperate and disgraceful struggle between powerful organizations, sometimes united, like the Italian *condottieri* and the Spanish brigands, in the form of "rings," to get control of the annual collection and distribution of one billion dollars, and to reap the benefits that grow out of the concession of privileges. The legislation placing this vast power in the hands of the successful combatants is only an incident of their work. It simply enables them under the form of law to seize the taxpayer, bind him like another Gulliver with rules and regulations, and to take from him whatever they please to promote their political ambition and private interests. From this point of view it is easy to see that politics has no more kinship with science or justice than pillage. Nor is it likely to make people more patriotic, high-minded, and benevolent than the rapacity of Robin Hood or Fra Diavolo.

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However startling or repugnant may be this view, it is the only one that furnishes an adequate explanation of the practice of government as carried on in every democratic country in the world. The work of private business and philanthropy, the work in which modern democracies have come to be chiefly engaged, is not in itself productive of the ethics and evils of war. Contrary to the common belief, industrial competition, which is conducted by voluntary co-operation, tends to the supremacy of excellence, moral and material. In societies where civilization has made headway, a merchant or manufacturer does not seek to crush rivals by misrepresenting them or assailing them in other ways. His natural and constant aim is to have his goods so cheap and excellent that the public will patronize him rather than them. To be sure, the ethics of war often

prevail in industrialism. They are not, however, one of its products; they are the fruits of militant ages and activities. But in political competition, which is coercive, the policy pursued is precisely the reverse. Not by proof of moral and material excellence does the politician establish his worth. Not by the superiority of his services or by his fidelity to obligations does he gain the esteem and patronage of the public. It is by the infliction of injury upon his rivals. He misrepresents them; he deceives them; he assails them in every way within his reach. When he triumphs over them he uses his power, not primarily for the benefit of the people whom he is supposed to serve, but to maintain his supremacy in order to pillage them. "Those who make war," says Machiavelli, whose famous book is a *vade mecum* for a modern politician as well as for an unscrupulous and a tyrannical prince, "have always and very naturally designed to enrich themselves and impoverish the enemy. Neither is victory sought nor conquest desirable except to strengthen themselves and weaken the enemy."

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In the light of this truth the organization of powerful political parties becomes natural and inevitable. It is just as natural and inevitable that the more numerous the duties intrusted to the State—that is, the greater the spoil to be fought for in caucus and convention and on the floors of legislatures—the more powerful, dangerous, and demoralizing they are certain to be. Were these duties confined to the maintenance of order and the enforcement of justice, it would be an easy matter for the busiest citizen to give them the attention they required. So simple would they be that he could understand them, and so important that he would insist upon their proper performance. But when they become vast and complex, including such special and difficult work as the education of children; the care of idiots, lunatics, and epileptics; the supervision of the liquor traffic, the insurance business, and railroad transportation, and the regulation of the amount of currency needed in an industrial community, it is beyond the powers of any man, however able, to understand them all, and, no matter how much time he may have, to look after them as he ought. When to these duties are added the management of agricultural stations; the inspection of all kinds of food; the extirpation of injurious insects, noxious weeds, and contagious diseases; the licensing of various trades and professions; the suppression of quacks, fortune-tellers, and gamblers; the production and sale of sterilized milk, and the multitude of other duties now intrusted to the Government, it is no wonder that he finds himself obliged to neglect public questions and to devote himself more closely to his own affairs in order to meet the ever-increasing burdens of taxation. Neither is it any wonder that there springs up a class of men to look after the duties he neglects, and to make such work a means of subsistence. The very law of evolution requires such a differentiation of social functions and organs. The politician is not, therefore, the product of his own love of spoliation solely, but of the necessities of a vicious extension of the duties of the State. There is nothing more abnormal or reprehensible about his existence under the present *régime* than there is about the physician or lawyer where disease and contention prevail. As long as the conditions are maintained that created him, so long will he ply his profession. When they are abolished he will be abolished. No number of citizens' unions, or nonpartisan movements, or other devices of hopeful but misguided reformers to abolish him, can modify or reverse this immutable decree of social science.

Politics tends to bring to the front the same kind of men that other social disorders do. A study of political leaders in the democratic societies of the world discloses portraits that differ only in degree from those that hang in the galleries of history in Italy in the fifteenth century, in Germany during the Thirty Years' War, and in France at the height of the French Revolution. Although the men they represent may not be as barbarous as Galeazzo or Wallenstein or Robespierre, they are just as unscrupulous and despicable. Like their prototypes, some of them are of high birth; others are of humble origin; still others belong to the criminal class. They do not, of course, capture cities and towns and hold them for ransom, or threaten to burn fields of wheat and corn unless bribed to desist; still they practice methods of spoliation not less efficient. By blackmailing corporations and wealthy individuals, they obtain sums of money that would have filled with bitter envy the leaders of the famous or rather infamous "companies of adventurers." With the booty thus obtained they gather about them numerous and powerful bands of followers. In every district where their supremacy is acknowledged they have their lieutenants and sublieutenants that obey as implicitly as the subordinates in an army. Thus equipped like any of the great brigands of history, they carry caucuses and conventions, shape the party policy, and control the legislation proposed and enacted.

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To be sure, the economic devastation of politics is not as conspicuous as that of war. It does not take the tragic form of burning houses, trampled fields of grain, tumbling walls of cities, and vast unproductive consumption by great bodies of armed men. Yet it is none the less real. Not infrequently it is hardly less extensive when measured in dollars and cents. Seldom does an election occur, certainly not a heated congressional or presidential election, that the complaint of serious interference with business is not universal. So great has the evil become that, long before the meeting of the national conventions in 1896, a concerted movement on the part of the industrial interests of the country was started to secure an abbreviation of the period given up to political turmoil. Even more serious is the economic disturbance due to legislatures. As no one knows what stupendous piece of folly they may commit at any moment, there is constant apprehension. "The country," said the Philadelphia Ledger, a year ago, referring to the disturbance provoked by the Teller repudiation resolution in the Senate and the violent Cuban debate in the House, "has got Congress on its hands, and, after their respective fashions, Senate and House are putting enormous weight of disturbing doubts and fears upon it.... To a greater or less degree a meeting of Congress has been during recent years anticipated by the community of business with timidity which in some instances has amounted to trepidation." The State legislatures are hardly better. No great industry has any assurance that it will not find itself

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threatened with a violent and ruinous assault in some bill that a rapacious politician or misguided philanthropist has introduced. In New York the attacks of these modern brigands have become so frequent and so serious that many of the larger corporations have had to take refuge in adjacent States,^[4] where they can enjoy greater, if not complete immunity. In a less degree the same is true of the minor legislatures—town, county, and municipal. Ordinances for pavements or sewers or in concession of valuable privileges keep the taxpayers in a state of constant anxiety. At the same time vast harm comes from the neglect of more important matters. The time of legislators is spent in intriguing and wrangling, and the millions of dollars that the sessions cost are as completely destroyed as though burned by invaders.

Though seldom or never recognized, politics has the same structural effect upon society as war. The militant forces of the one, like the militant forces of the other, tend to the destruction of social mobility and the creation of social rigidity, making further social evolution difficult or impossible. There is a repression of the spirit of individual initiative, which calls into existence just such institutions as may be required at any moment and permits them to pass away as soon as they have served their purpose. There is an encouragement of the class and parasitic spirit, which produces institutions based upon artificial distinctions, and, like those in China, so tenacious of life as to defy either reform or abolition. To provide place and pelf for followers, political leaders, aided by the misdirected labors of social reformers, favor constantly the extension of the sphere of government in every direction. In New York, for example, during the past eighteen years, thirty-six additions to State offices and commissions have been made. Simultaneously, the expenditures on their account have grown from less than four thousand dollars a year to nearly seven million. This feudal tendency toward the bureaucracy that exists in France and Germany, and in every country cursed with the social structure produced by war, is not only the same in the other States, but in the Federal Government as well. Its latest manifestation is the amazing extension of the powers of the interstate commerce commission demanded in the Cullom bill, and the proposed establishment of a department of commerce to promote trade with foreign countries. As in New York, there has been an enormous increase in Federal expenditures. In the agricultural department it has been from \$3,283,000 in 1887 to \$23,480,000 in 1897. In other departments the increase has ranged from nineteen per cent in the legislative and twenty-three in the diplomatic and consular to seventy in the Indian, seventy-seven in the post office and river and harbor, and one hundred and thirty-three in the pension. Another manifestation is the pressing demand for the extension of the pension system to civil officials. Already the system has been extended to policemen and firemen. In some States the teachers in the public schools receive pensions, and in others the clamor for this form of taxation is loud and persistent. At the present time a powerful movement is in progress to pension the civil servants of the Government. Still another manifestation is the passage of laws in revival of the old trade and professional corporations. For a long time those in protection of the legal and medical professions have been on the statute-books, if not always in force. But, as always happens, these bad precedents have been used as arguments in favor of the plumbers, barbers, dentists, druggists, and other trades and professions. But the most absurd manifestation is the social classification of Government employees in accordance with the size of their salaries, a form of folly particularly apparent in Washington, and the establishment of patriotic and other societies, like the Sons and Daughters of the American Revolution, the Baronial Order of Runnymede, and the Royal Order of the Crown, that create social distinctions based, not upon character and ability, but upon heredity. Could anything be more un-American, to use the current word, or hostile to the spirit of a free democracy?

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In the intellectual domain politics works a greater havoc than in the social. Politicians can no more tolerate independence in thought and action than Charles V or Louis XIV or Napoleon I. "I have never had confidence in political movements which pretend to be free from politics," said the Governor of New York at the close of the campaign that restored Tammany Hall to power in the metropolis, showing that the intolerance of this form of warfare does not differ from that of any other. "A creed that is worth maintaining at all," he added, using an argument made familiar by the agents of bigotry everywhere, "is worth maintaining all the time.... Do not put your faith in those that hide behind the pretense of nonpartisanship," he continued, striking a deadly blow at all party traitors; "it is a device to trap the thoughtless and unsuspecting." As was shown during the Blaine-Cleveland campaign of 1884, politicians treat dissent as proof of unmistakable moral and intellectual baseness. Only the progress of civilization prevents them from pouncing upon such men as George William Curtis, Carl Schurz, and Wayne McVeagh with the ferocity of the familiars of the Inquisition. As it is, they are regarded with more abhorrence than the members of the opposition; they are treated with a greater wealth of contempt and hatred, and often pursued with the malignant vindictiveness of the cruelest savages. "I submit," said Mr. Wanamaker in one of his speeches against the Quay machine, "that the service of self-respecting men is lost to the Republican party by vile misrepresentations of reputable people, employment of bogus detectives, venomous falsifiers, a subsidized press, and conspirators who dare any plot or defilement, able to exert political control, and by protecting legislation and by domination of legal appointees of district attorneys and others not in elective but appointive offices." During the memorable campaign of 1896, when political bitterness and intolerance reached perhaps the highest point in the history of the United States, thousands of voters, driven by the scourge of "party regularity," either concealed or disavowed their convictions, and marched under banners that meant repudiation of public and private obligations. Even one of Mr. Cleveland's Cabinet officers, who had stood up bravely for the gold standard, succumbed to party discipline and became an apostate. The intolerant spirit of politics extends to dictation of instruction of students. The prolonged assaults of the protectionists upon Professor Perry and Professor

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Sumner are well known. The same spirit inspired the attack upon President Andrews, of Brown University, the dismissal of the anti-Populist professors in the Agricultural College of Kansas, and the populistic clamor against certain professors in the universities of Missouri and Texas. That politics produces the same contempt for culture and capacity that war does, evidence is not lacking. "There is," said Senator Grady, of Tammany Hall, apologizing for the appointment of some illiterate to office in New York city, "a class of persons, chiefly the educated, who think that if a man begins a sentence with a small letter, or uses a small 'i' in referring to himself, or misspells common words, that he is unfit for public office. Nothing could be further from the truth," he continues, using an argument that the barbarians that overran Europe might have made; "it is an idea that only the aristocracy of culture could hold.... We do not want the people ruled by men," he adds, giving a demagogic twist to his reasoning, "who are above them, or who fancy they are because they have wealth or learning or blood, nor by men who are below them, but we want them ruled in a genuine democracy by men who are the representatives in all their ways of thinking, feeling, speaking, and acting, of the average man." What is wanted, in other words, is not men anxious to acquit themselves with ability and fidelity to the public interests, but men that will look after the interests of their organization and do the other work of political *condottieri*. It can, of course, be a matter of no consequence whether such men spell or speak correctly, or whether they conduct themselves like boors and ruffians.^[5]

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As implied in all that has been said, it is, however, upon morals that the effect of politics is the most deplorable. From the beginning of the discussion of the party platform and the nomination of the candidates to the induction of the successful combatants into office, the principles applied to the transaction of business play the smallest possible part. The principles observed are those of war. All the tactics needful to achieve success in the one are indispensable to success in the other. First, there is, as I have already said, an attempt to misrepresent and injure political opponents, and, next, to confuse, befool, and pillage the public. I shall not, however, describe the factional conflicts that precede a convention—the intrigue, the bribery, the circulation of false stories, and even the forgery of telegrams like the one that brought about the nomination and defeat of Secretary Folger. They exhibit only on a small scale the ethics of party warfare in general. More needful is it to illustrate these, and to make clear the vanity of any hope of moral reform through politics, or through any other agency, either religious, philanthropic, or pedagogic, as long as it remains a dominant activity of social life.

"If Mr. Gage had been a politician as well as a banker," said Senator Frye, criticising the secretary's honesty and courage at a time when both were urgently needed, "he would not have insisted upon a declaration in favor of a single gold standard. It was all right for him to submit his scheme of finance, but hardly politic to be so specific about the gold standard." Always adjusted to this low and debased conception of duty, a party platform is seldom or never framed in accordance with the highest convictions of the most intelligent and upright men in the party. The object is not the proclamation of the exact truth, as they see it, but to capture the greatest number of votes. If there is a vital question about which a difference of opinion exists, the work of putting it into a form palatable to everybody is intrusted to some cunning expert in verbal juggling. A money plank, for instance, is drawn up in such a way that the candidate standing upon it may be represented by editors and orators of easy consciences as either for or against the gold standard. The same was true for years of the slave and tariff questions; it is still true of the temperance question, the question of civil-service reform, and of every other question that threatens the slightest party division. Again, questions are kept to the front that have no more vitality than the dust of Cæsar. Long after the civil war the issues of that contest formed the stock in trade of the politicians and enabled them to win many a battle that should have been fought on other grounds. If need be, the grossest falsehoods are embodied in the platform, and proclaimed as the most sacred tenets of party faith.

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When the campaign opens, the ethics of the platform assume a more violent and reprehensible shape. Not only are its hypocrisies and falsehoods repeated with endless iteration, but they are multiplied like the sands of the beach. Very few, if any, editors or orators pretend to discuss questions or candidates with perfect candor and honesty. Indeed, very few of them are competent to discuss them. Hence sophistry and vilification take the place of knowledge and reason. Were one party to adopt the Decalogue for a platform, the other would find nothing in it to praise; it would be an embodiment of socialism, or anarchism, or some other form of diabolism. If one party were to nominate a saint, the other would paint him in colors that Satan himself would hardly recognize. Not even such men as Washington and Lincoln are immune to the assaults of political hatred and mendacity. As the campaign draws to a close, we have a rapidly increasing manifestation of all the worst traits of human nature. In times of quiet, a confessed knave would scarcely be guilty of them. False or garbled quotations from foreign newspapers are issued. The old Cobden Club, just ready to give up the ghost, is galvanized into the most vigorous life, and made to do valiant service as a rich and powerful organization devoted to the subversion of American institutions. Stories like Clay's sale of the presidency are invented, and letters, like the Morey letter, are forged, and, despite the most specific denials of their truth, they are given the widest currency. Other forms of trickery, like the Murchison letter, written by the British minister during Mr. Cleveland's second campaign, are devised with devilish ingenuity, and made to contribute to the pressing and patriotic work of rescuing the country from its enemies.

But this observation of the ethics of war does not stop with the close of the polls, where bribery, intimidation, and fraud are practiced, and the honest or dishonest count of the ballots that have been cast; it is continued with the same infernal industry in the work of legislation and administration. Upon the meeting of the statesmen that the people have chosen under "the most

perfect system of government ever devised by man," what is the first thing that arrests their attention and absorbs their energies? More intriguing, bargaining, and bribery in a hundred forms, more or less subtle, to secure election and appointment to positions within the gift of the legislature. Little or no heed is given to the primary question of capacity and public interests. Political considerations—that is, ability to help or to harm some one—control all elections and appointments. What is the next thing done? It is the preparation, introduction, discussion, and passage of the measures thought to be essential to the preservation of civilization. Here again political considerations control action. Such measures are introduced as will strengthen members with their constituents, or promote "the general welfare" of the party. Very rarely have they "the general welfare" of the public in view. Sometimes they seek to change district boundaries in such a way as to keep the opposition in a perpetual minority. Sometimes they have no other motive than the extortion of blackmail from individuals or corporations. Sometimes their object is to throw "sop to Cerberus"—that is, to pacify troublesome reformers within the party, like the prohibitionists and the civil-service reformers. Sometimes they authorize investigations into a department or a municipality with the hope that discoveries will be made that will assist the party in power or injure the party out of power; it happens not infrequently that they are undertaken to smother some scandal, like the mismanagement of the Pennsylvania treasury, or to whitewash some rascal. Sometimes they create commissions, superintendents, or inspectors, or other offices to provide rewards for party hacks and heelers. Finally, there are the appropriation bills. Only a person ignorant of the ways of legislators could be so simple-minded as to imagine that they are miracles of economy, or that they are anything else but the products of that clumsy but effective system of pillaging known as log-rolling, which enables each to get what he wants with the smallest regard for the interests of the taxpayer.

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It is, however, during the debates over these wise and patriotic measures that the public is favored with the most edifying exhibition of the universal contempt of the legislator for its interests. They disclose all the scandalous practices of a political campaign. There are misrepresentations, recriminations, and not infrequently, as in the case of Sumner, personal assaults. A perverse inclination always exists toward those discussions that will put some one "in a hole," or enable some one to arouse party passion. For this purpose nothing is so effective as a foreign question, like a Cuban belligerency resolution, or a treaty for the annexation of Hawaii, or a domestic question, like responsibility for the crime of 1873, or the panic of 1893, or a comparison of party devotion to the interests of the "old soldier." Not the slightest heed, as has been shown on several occasions during the past few years, is paid to the shock that may be given to business or to the disturbance of pacific relations with foreign powers. In fact, the greater the danger involved in the discussion of a delicate question, the more prone are the demagogues to mouth it. To such questions as bankruptcy, railroad pooling, and currency reform will they give their time and wisdom only when business interests have almost risen in insurrection and compelled attention to them.

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The same policy of hypocrisy, deception, favoritism, and proscription is a dominant trait of the administration of the Government. The object almost invariably in mind is the welfare or injury of some party, or faction, or politician. The interests of the public are the last thing thought of, if thought of at all. Take dismissals and appointments. They may, as has been known to occur even in the United States, be made to better the public service. Even then a careful study of motive will disclose the characteristic purpose of the politician. In a choice between two men of equal ability, or rather of equal inability, which is more commonly the case, preference is given to the one with the stronger "pull." Often, as has been shown within the past year or two, convicted rascals are appointed at the behest of Congressmen and in defiance of the wishes of the business community, and, in spite of the civil-service laws, officials are dismissed because of their politics alone. In the letting of contracts it is not difficult to detect the observance of the same judicious rule. The virtuous formality of letting to the lowest bidder may be gone through with, and the public may be greatly pleased with this exhibition of official deference to its interests. Yet an examination of the work done under the supervision of complaisant inspectors, who may be blinded in various ways to the defects of that of a political friend, or made supernaturally alert to the defects of that of a political enemy, will reveal a trail that does not belong to scrupulous integrity. That is why dry docks, like that in Brooklyn, why harbor works, like those in Charleston, turn out defective; why the Government has to pay more for the transportation of the mails than a private corporation; why the cost of the improvement of the Erie Canal was concealed until nearly all the money voted for the folly had been expended; why of the money expended one million dollars was wasted, if not stolen; why so much of the State Capitol at Albany has been built over again; why the City Hall in Philadelphia has been an interminable job; why the supplies of prisons, asylums, and other public institutions are constantly proving to be inferior to those paid for—why, in a word, everything done by political methods is vitiated by the ethics of war. In the enforcement of laws very little justice or honesty can be found. As a rule, they bear much more harshly on the poor and weak, that is, those with small political influence, than on the rich and strong, that is, those with much political influence. Take the enforcement of liquor laws, health laws, factory laws, and compulsory school laws. If a man with political influence wishes to keep his children at home for any purpose, no truant officer is indiscreet enough to trouble him; if, however, a poor woman, just made a widow, wishes to have her oldest son work in disregard of the statute, in order to keep her and her younger children out of the poor-house, his official zeal is above criticism. Politics poisons even the fountains of justice. Criminals that have sufficient political influence can escape prosecution or obtain pardon after conviction. Prosecuting officers are importuned incessantly, even by "leading citizens," to abandon prosecution of them or to "let them off easily." In the appointment of receivers and

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referees, judges are much more inclined to give preference to political friends than to political enemies. Finally, if political exigencies require it, there is no hesitation to invoke the latent savagery of a nation. In proof, recall the Venezuelan message of Mr. Cleveland, which "dished" the Republican jingoes, and the German emperor's assault upon Hayti and China to secure the adoption of his naval bill. To make the record complete, I ought to add that for a purpose more odious—namely, the increase of sales—newspapers, always the ready recipients of political patronage, commit the same atrocious crime against civilization.

Since politics is a form of civil war, involving aggressions upon person and property, any extension of its field of operation must be attended by precisely the same moral and economic effects that attend the pursuit of civil war itself. No concession of suffrage to women, nor any legal machinery, however ingenious, that may be invented, will alter that fact. Already we are confronted with alarming manifestations of the decadence of society that have always accompanied civil strife. The public burdens are becoming so great, equaling the per capita rate prevailing at the outbreak of the French Revolution, that people in cities as well as in the country are being driven from their homes by the sale of their property for unpaid taxes. Both classes are joining the ranks of "the disinherited," just as similar classes joined the brigands in France and Italy, and are clamoring for the trial of the thousand absurd schemes for social ills known as populism and socialism, all meaning an increase of the functions of government, still further aggressions upon persons and property, and an aggravation of the evils already complained of. At the same time the moral tone of society is rapidly sinking to a low level. "It is a melancholy reflection," says the report of the New York State tax commission, dwelling upon the desperate efforts of people to escape the aggressions committed on them and disclosing the observance of a code of ethics committed in every walk in life, "that in this Christian age neither the memory of early moral training, nor present religious profession, hopes or fears for the hereafter, the penalties of the law, nor any other possible considerations are sufficient to restrain the average possessor of personal property from forcing other men to pay the taxes for which he is justly liable, by methods unquestionably immoral, if not absolutely criminal." Further evidence of the same startling and deplorable fact, one recalling the cruel indifference of the privileged classes of the ancient *régime* to the sufferings of the people that bore the burdens that they ought to have shared, is to be found in the universal tendency of people to get public improvements at the expense of others, such as free baths, normal schools, interoceanic canals, etc., and the shocking prevalence of crimes of violence in every part of the country. To be sure, there are coupled with this alarming decadence extraordinary religious, philanthropic, and pedagogic efforts to rescue society from the depths of degradation to which it is sinking. But, as is shown by the history of the unparalleled moral enthusiasm of thousands of ascetics and teachers of the highest character during the decadence of Rome and the disorders of the middle ages, they will be absolutely ineffective as long as the conditions prevail that engender envy, hatred, deception, plunder, and murder, destroying not only morality, but every vestige of fellow-feeling and patriotism. "There is a nation," says Mr. Bodley in his new book on France, bringing out this profound and important truth, "to the members of which Frenchmen are more revengeful than to the Germans, more irascible than to the Italians, more unjust than to the English. It is to the French that Frenchmen display animosity more savage, more incessant, and more inequitable than to any other race." Precisely the same effect is to be noticed in the United States—the inevitable effect of every form of aggression, even though it have the most benevolent object in view.

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Yet the conclusion is not that people should abstain from politics. That would involve greater evils than those that now prevail. It would be submission to aggression—freedom to predatory politicians to continue their pillage. The thing to be done is to take up arms against them, and to wage relentless war on them. But the object of the struggle must not be the substitution of one set of politicians for another, but to reduce to the smallest possible limits the sphere of all political activity. Until this is done there can be no release from so important a duty to self and to the community.

SIR W. MARTIN CONWAY, with his two Swiss guides, Antoine Maquiguez and Louis Pellissier, on September 9, 1898, reached the top of Yllimani, Bolivian Andes, near La Paz. The party were five days reaching the summit, 22,500 feet above the sea, from the highest point of cultivation. The guides were the same who ascended Mount St. Elias in 1897 with Prince Luigi of Savoy.

MY PET SCORPION.

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By NORMAN ROBINSON.

When I first came to Florida I heard terrible accounts of the deadly work of a poisonous "bug," popularly known as the "grampus" or "mule-killer."

My first informant was a "Florida cracker," who seemed fairly intelligent, and whom I had employed in a little woodcraft. He happened to encounter one of those terrible creatures, and promptly "smashed" it with his axe. On expressing regret that I had no opportunity of seeing it before it was crushed into so shapeless a mass, he gravely assured me that he "didn't take no

resks on them varmints. Them's the pisenest things in Floridy. Rattlers ain't nowhar! A man what gits bit by one of them critters—no medicine can't save him! We calls 'em mule-killers, cause they's wust on mules. A hoss nor a dog don't seem to mind 'em, but a mule is done dead when one of them varmints strikes 'em."

I cross-questioned my informant a little as to his personal knowledge of the matter, and especially as to the fatal results following the bite of this very astonishing "bug." "Did you ever know," said I, "of a mule's dying from the bite of this 'mule-killer'?"

"Oh, yes, I've knowed of several, and I hearn tell of lots. Ole man Jernigan, he loss a likely mule what got struck by one of them critters, and there was a man what died down to the Johnson place, bit by one of them things. They tells me he took whisky enough to kill two men, but it didn't do him no bit of good. He was powerful fond of whisky, anyway, and he died mighty easy."

I subsequently made some inquiries in regard to these supposed casualties, and came to the conclusion that my informant's accounts of them were largely mythical. A mule had died in the neighborhood mentioned, but the "mule-killer" was colic; and in the case of the man, although he claimed to have been bitten by a "grampus," it was generally believed that the "serpent of the still" was the most deadly "varmint" he had recently encountered.

I soon found, however, that the belief in the venomous character of this "whip scorpion," or *Thelyphonus giganteus*, as it proved to be, was almost universal. The negroes, especially, are in mortal terror of it. Only a few days since a colored boy that I had employed in hauling wood brought me a small specimen, completely crushed, with the triumphant announcement, "I've got him, but he like to done strike me 'fore I seed him."

"But how do they bite?" I asked, "with their claws?"

"Dey don't bite at all! Dey jes' strike you with de tail, and dey's a pizen juice comes out, and den no doctor kain't save you!" [Pg 606]

Newspaper stories confirming this belief occasionally go the rounds. I remember reading one particularly circumstantial account of the mishaps of a camping party somewhere in south Florida. "They were a long way," said this veracious chronicler, "from any human habitation, and the loss of their one mule from the bite of this pestiferous scorpion brought with it no end of inconvenience and trouble."

The distressing story was told with great detail, and it was certainly not calculated to diminish the popular dread with which this supposed venomous creature is regarded. Even in scientific journals we find an occasional echo of this general belief. Dr. Packard, too, certainly good authority, in his Study of Insects accepts the current theory.

In the Proceedings of the Washington (D. C.) Entomological Society there is an interesting discussion of this very question (vol. ii, No. 2). Professor Howard stated that a case of the bite of the *Thelyphonus* with fatal results was vouched for by a Mr. Dunn, a professed naturalist, and that his testimony was entitled to weight. Mr. Ashmead and Mr. Banks, both of whom had been familiar with the *Thelyphonus* in Florida, had handled them frequently, and believed them harmless. Dr. George Marx confirmed this view by stating that dissection failed to show the presence of any poison sac or fangs, a statement which it seems has been confirmed by subsequent investigations.

Altogether here was a "muddle" of conflicting testimony, which could only be accounted for by supposing "some one had blundered."

A few months since, for my own satisfaction, I determined to make a special study of our Florida "grampus." Not the least curious question that first suggests itself is how this name, "grampus" (French, *Grand poisson, great fish*), one of the *Cetaceæ*, ever got tacked on as a popular label for our Florida *Thelyphonus*. I am utterly at a loss to account for it.

Before catching "my bird" I, of course, had to make a cage for it. This was constructed out of a large cigar box. About half of one end was removed and replaced by wire gauze. In addition to the hinged wooden cover, with which the box was furnished, I arranged a second one of wire gauze, hinged on the opposite side, and closing underneath the wooden one. This gave full control of light and air, both by day and night, without disturbing my future prisoner, and at the same time diminished the danger of his escape.

I knew very well that the scorpion I was after was of a very modest and retiring disposition, and was never seen above ground in daylight except by accident or mistake. I was also under the impression that they were becoming rather rare, as it was more than a year since I had seen one. Still, it was with the most abundant confidence, to say nothing of the more prosaic requisites of a stout pair of gloves, a paper bag, and a hoe, that I started out one afternoon to find my *Thelyphonus*. I directed my course to the nearest wood, not for a moment doubting that a few hours' work would bring to light the object of my search. I labored faithfully until dark, overturning rotten logs, sticks, bark, old rails, and other field and woodland *débris* under which my "grampus" would be likely to be hiding, but the search was altogether fruitless. [Pg 607]

I then concluded to try a plan which I have usually found quite successful. I told some of the bright boys in town what I wanted, and offered them a liberal price for every live "grampus" they would bring, cautioning them that their bite was said to be poisonous, and at the same time instructing them exactly how to catch and handle them. This scheme was also a failure. I then

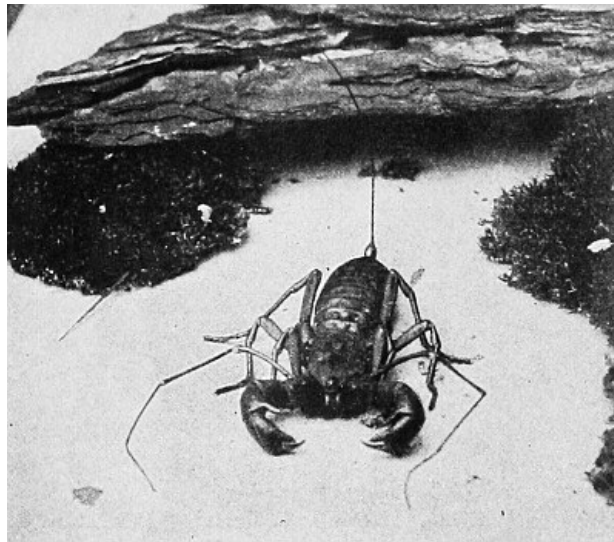
asked several friends who are interested in natural history to aid me in the search. One gentleman, who is a surveyor, and who in the pursuit of his profession passes much of his time in the woods, entered with special interest into my quest. These plans were all equally barren of results.

One day, after I had practically given up the search, I was hoeing among the sprouts at the base of an old orange tree that had fallen a victim to the "big freeze" when, under a pile of chips at the base of the old stump, I suddenly unearthed my long-looked-for *Thelyphonus*. It was a fine, full-grown specimen, decidedly resentful at this sudden intrusion upon its privacy, and if a formidable pair of expanded claws, brandishing tail, and a generally vicious look meant anything, it was a customer that a prudent man would not care to pick up with bare hands. With the aid of a wide-mouthed preserving jar and a stick it was, however, soon secured, and in a short time transferred to the cage that had been so long waiting for its occupant.

A few words may not be amiss concerning the great family of which my little captive is not the least interesting member. The *Thelyphonidæ* belong to the great spider family, *Arachnida*, which includes not only the true spiders, but also the mites (*Acarids*), the ticks (*Ixodes*), the *Tartarides*, *Phrynides*, *Phalangides*, and other more or less related and mostly tropical groups. The whole subclass has certain pretty well-defined characteristics. They are almost without exception carnivorous (*insectivorous*). They are seldom subject to metamorphosis. The legs are usually eight in number. The eyes are always situated on the cephalo-thorax (head and breast plate), and not infrequently are the same in number as the legs. Not a few are fitted with poison sacs and fangs, and in the case of some of the larger true spiders and scorpions the venom is very virulent, and in some instances has proved fatal to human life.

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As this is hardly the place for a technical description of my *Thelyphonus*—a female—I shall content myself with a few facts and measurements. Those who are curious as to her personal appearance can consult the accompanying photograph. Most persons will conclude that her beauty is not even "skin deep."



The following post-mortem data will perhaps aid in giving a clearer idea of this curious little creature. The length of the body from the front of the cephalo-thorax to the end of the last post-abdominal segment was fifty-two millimetres—a little more than two inches; the length of the tail was fifty millimetres, thus making the total length about four inches. The width of the abdomen in its widest part, near the center, was thirteen millimetres, or approximately half an inch. The claw-bearing palpi, or "feelers," which are large and very powerful, have an extreme expansion of fifty-eight millimetres, nearly two and a half inches. The tail is a curious organ, and consists of forty-four short, jointed sections of a pale wine color, with a light yellow ring at the base; a few short, scattered pointed hairs are found on each segment. It is about two thirds of a millimetre in thickness at the base and tapers to about half this diameter at the end. When alarmed, the *Thelyphonus* holds it curved over forward after the manner of the true scorpions; a habit that probably points to some common ancestor. Its true function appears to be that of an extra palpus or "feeler."

The *Thelyphonus* is generally of a wine color. In some places, as on the cephalo-thorax, this color is black; around the mouth parts, the legs, the sternal plate, and the under side of the abdomen, this wine color is very pronounced.

The eyes are eight in number. Two of them are close together, on opposite sides of a slightly elevated ridge at the front of the cephalo-thorax. These eyes are bright, black, and beadlike, and about two thirds of a millimetre in diameter. A little farther back, on the outer edges of the cephalo-thorax, are placed the remaining six eyes, three on a side, in a triangular group. These eyes are not quite as large as those in front, but they are of a shining yellow color, and altogether give the face of the whip scorpion a decidedly uncanny look.

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But to return to the history of my pet. As Madam *Thelyphonus* had obviously been accustomed to rather primitive furniture, I did not overburden her new apartments. A thickly sanded floor, a salt dish filled with fresh water, a square of pine bark the size of my hand, slightly elevated, with a

few nice pieces of green moss to remind her of the country home she had left, and my involuntary guest was ready for housekeeping. She accepted her new quarters without question or examination, and promptly retired to her bedroom under the bark.

But housekeeping, even for a whip scorpion, involves the food question. Here I was upon uncertain ground. The strictly nocturnal habits of the *Thelyphonus* render all such investigations difficult. Naturally, the authorities on this point are somewhat indefinite or conflicting. The first things which I placed in the cage were a number of roaches of assorted sizes. One investigator claims that they are readily eaten by the *Thelyphonus*. Twenty-four hours passed and not a roach was missing.

The matter, however, in which I felt a more immediate interest was the supposed venomous character of my new pet. My experiments were, therefore, especially directed to the settlement of this question. The next night a large, full-grown toad, that for some time had made his home in my back yard, was placed in the cage. The roaches were still there, and right here a very interesting thing happened. The largest cockroach, nearly two inches in length, was upon the side of the cage. The toad had hardly got comfortably seated immediately in front of him when the cockroach suddenly disappeared. I could not say that I saw him disappear. I was looking directly at both, but the "dissolving view" was too rapid for the eye to follow. To say that it was "quick as a flash" would depend somewhat on what kind of a "flash" was meant. I think nitroglycerin would undoubtedly have kept up with my *bufo*; but, judging from what I saw, or rather didn't see, I should say that this toad could have swallowed about six cockroaches while gunpowder was getting ready to go off! Any one who wishes to get an entirely new view of the meaning of the phrase "with neatness and dispatch" should by all means try this "lightning combination" of cockroaches and a Florida toad!

And now I was all ready for the coming "battle royal" that I had reason to suppose would take place between my little captives. I cautiously removed the bark under which Madam *Thelyphonus* was hiding, and then awaited results.

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They didn't come. The *Thelyphonus* kept perfectly still, ditto the toad. I must stir them up. With a stick I tried to irritate the scorpion. She proved a perfect marvel of patience. She wouldn't "irritate" worth a cent. I poked the toad over and on top of the supposed vicious and venomous creature. The latter crept out from under her unusual burden and crawled into a corner. The toad in a dazed sort of way pulled himself together and hopped off. I still kept up my pokings and proddings, thinking that possibly my "grampus" could at last be teased into some manifestation of her supposed deadly powers. It was a complete failure. Madam *Thelyphonus* proved to be a perfect model of patient endurance under persecution. All I could do, there was not a sign or motion of resentment. She could not be teased or tormented into biting, pinching, or fighting anything or anybody. My little captive had all the "ornaments of a meek and quiet spirit," and her only desire seemed to be to get out of the way. Now here was certainly a curious contrast between reputation and real character. A whole Stateful of slanderous natural history was disappearing under my very eyes! "Mule-killer," indeed! Why, my little captive couldn't be coaxed or goaded into harming a fly. In patient sufferance and persistent good nature she could have given points to "Uncle Toby," in his celebrated interview with that annoying insect. Still, although this first experiment quite convinced me that my *Thelyphonus* was entirely harmless, I concluded to leave my captives together for the night. In the morning, as I expected, both were in the best of health and spirits, the toad eager to jump out, the scorpion eager to be let alone.

The next night I tried a mouse. This sharp-toothed, frisky little rodent would, I thought, be likely to get into trouble if there was any to be found. The teasing process was not repeated, as it had proved such a complete failure. The mouse, however, ran round the cage, tumbling over the *Thelyphonus*, in the most rapid and reckless way. Every time the latter seemed to regard these awkward encounters as unavoidable accidents, and excused them accordingly. As to biting, pinching, or resenting them in any way, she showed not the slightest symptom of them. She simply crawled into a corner and kept as quiet as circumstances would permit. As in the case of the toad, both were left together overnight. All that really happened, so far as I could see, was that the mouse had nearly gnawed a hole through the cage; but evidently he was none the worse for having shared his bedroom with this terrible "mule-killer," "worse than a rattlesnake," according to the accepted belief.

It is certainly a curious question how so perfectly harmless a creature can have acquired such a bad reputation. I know of no modern parallel. In Shakespeare's time a similar popular prejudice was entertained against one of the most useful servants that farmers and horticulturists possess. The well-known lines—

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"The toad, ugly and venomous,
Holds yet a precious jewel in its head"—

were but the echo of this crude and cruel fancy. So with our *Thelyphonus*. It is not only absolutely harmless, but, as I shall soon show, one of the most useful helps in keeping within bounds one of our most serious pests.

The comment that I once heard, by a not over-intelligent and somewhat profane individual, upon seeing a dead whip scorpion—"Any --- fool can see that that critter is rank pisin!"—probably partially explains the matter. It must be conceded that the looks of the *Thelyphonus* are decidedly against it. Its long, frisky tail, its big, threatening claws, and its generally uncanny and vicious

appearance are quite sufficient to inspire caution if not positive dread. It "looks pisin," and that settles it with the ignorant. With the better informed the fact that the creature belongs to a bad family, that its nearest relatives are unquestionably venomous, may help to explain, though it can hardly excuse, the widespread currency which even scientific men have helped to give to a most erroneous and slanderous belief.

And now as to the food question. This, of course, was a very vital matter to my little prisoner, and one of great interest to me. After the failure of the cockroach diet, I next tried grasshoppers. These also have been declared to be greatly relished by the *Thelyphonus*. I did not find it so. The first one placed in the cage was, to be sure, partially eaten. But, unfortunately, a colony of ants had got into the cage, and were dining on my dead *Gryllus*. This left the matter a little uncertain. On fencing out these intruders, and repeating the experiment with the same and half a dozen other species, I became convinced that my *Thelyphonus*, at least, was not fond of grasshoppers. Then began a kind of general system, or no system, of haphazard feeding, or rather trials of food. My marketing range for my particular "boarder" was by no means a limited one. During the month of September, when most of these investigations were in progress, Florida is by no means deficient in insect life. Every day from two to ten new and different species were placed in the cage. A list was kept, to avoid repetition, until my captive was offered her choice of something over a hundred varieties of "bugs," worms, grubs, spiders, ants and their eggs, lizards, butterflies, etc.—everything, indeed, that I could think of or conveniently catch, which it seemed possible my little captive might fancy. Of all this heterogeneous collection, nothing, so far as I could see, was ever killed or eaten. A tiny piece of fresh beef, placed in her cage at night, was the only thing that I could persuade her to touch. Even of this I am not absolutely certain. In the morning these little pellets of fresh meat were usually found rolled in the sand and often apparently diminished in size. Several times they disappeared altogether. The presence, however, of other predatory insects sometimes left the matter a little in doubt. But, as my captive remained in good health for over a month while this plan of trial dieting was in progress, I am inclined to think that more or less of the fresh beef was really consumed by her. Still, she took the greatest care that I should never catch her eating, even when surprised with a sudden light at night, a time when she was always especially active.

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I was getting a little tired of this seemingly fruitless investigation, and had about concluded to persuade my *Thelyphonus* to crawl into a bottle in company with a few drops of chloroform, to have her picture taken, and then forward the "embalmed remains" to the Museum of Natural History in Central Park, New York, to which they had already been promised.

I concluded, however, to make one more effort. So the next day I spent some time in hunting for new and untried insects, of which I procured half a dozen or so, and among other things quite a lot of so-called "wood-lice," "white ants," *termites*, our only representative of a family that in most warm countries is so destructive to exposed wooden structures. All of these "finds" were tumbled, as usual, upon the floor of my captive's cage, and I left them with very little expectation that she would see among them anything that suited her fastidious taste. The next morning, to my surprise, every white ant had disappeared; nothing else was touched. The question was solved. For about three weeks my *Thelyphonus* was supplied each day with a liberal allowance of what in this latitude, at least, seems to be its exclusive food.

Now, this white ant (*Termes flavipes*) is in Florida one of our worst pests. Possibly there may be some compensating benefits which they confer, in the more rapid removal of decaying vegetable matter. In most respects, however, they are an unmitigated nuisance. The annual destruction of property, of fencing, building foundations, and exposed woodwork of every kind must be estimated at hundreds of thousands of dollars. The worst of it is, too, that it is impossible to know when they are at work. They are always hidden. In case they are compelled in their destructive labors to pass over the outside of anything, they always build a hard gallery of cemented sand or clay, under which they travel securely. Unfortunately, too, they do not always confine their ravages to dead wood. Every orange grower fears them, and if they once get a foothold the tree that they attack is often destroyed before anything is suspected to be the matter. They "love darkness rather than light," and "their deeds are evil." And it is these miserable pests that my little-appreciated and much-slandered *Thelyphonus* has been all her life fighting! And those big, strong claws of hers, that look so formidable, what are they for but to tear down and break in pieces the hard, honeycombed structures in which her food is hidden? It was all plain enough now!

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I confess, when I first discovered these facts which turn popular natural history so completely topsy-turvy, I felt like taking off my hat and making my profoundest bow to my little captive, and in the name of justice and humanity asking pardon for all the slanders and indignities heaped upon her race.

Since writing the above, a private note from Prof. L. O. Howard, chief of the Division of Entomology in the United States Department of Agriculture, Washington, D. C., furnishes important additional testimony upon the question of the harmlessness of this arachnid. Professor Howard says, "The *Thelyphonus* is not poisonous."

Perhaps a way of reconciling at least some of the conflicting statements that have been made on the subject may be found in the facts revealed by modern bacteriological investigations. It is well known that under special conditions the bite of the most harmless animal may convey to the human system pathogenic germs which will speedily prove fatal. Most of the deaths reported in the newspapers from the bite of the *Thelyphonus* are no doubt imaginary, or due entirely to other

causes. Any well-authenticated case—if such there has been—is probably to be explained in the manner above indicated. This theory, too, helps to "let down easy" some prominent naturalists whose great names have served to give countenance to one of the most widespread and persistent errors in current natural history.

In a memorial address of the late Dr. James Hall, made at the recent meeting of the Geological Society of America, Secretary H. L. Fairchild referred to Dr. Hall's development as almost coeval with that of the science of geology in America, and his sixty-two years of activity as connecting the work of the self-taught pioneers in this branch with the widespread field of activity of to-day. Dr. Hall's accuracy and well-balanced observation had made his first work, a report on the Geology of Western New York, a classic of the science to-day.

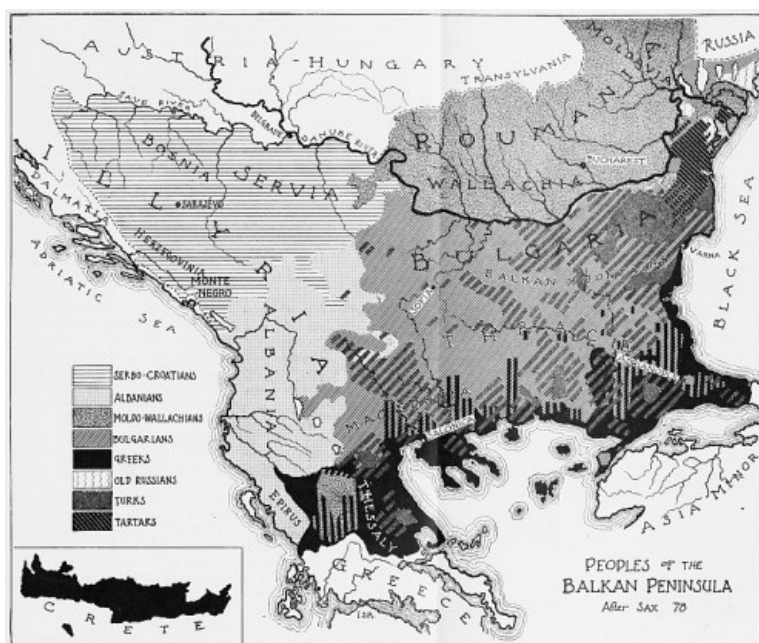
THE PEOPLES OF THE BALKAN PENINSULA—THE GREEK, THE SLAV, AND THE TURK. [6]

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By WILLIAM Z. RIPLEY, PH. D.,

ASSISTANT PROFESSOR OF SOCIOLOGY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY; LECTURER IN ANTHROPO-GEOGRAPHY AT COLUMBIA UNIVERSITY.

The significant geography of the Balkan Peninsula may best be illustrated by comparing it with the other two south European ones, Italy and Spain. The first point to notice is that it is divided from the mainland by rivers and not by a well-defined mountain chain. Iberia begins definitely at the Pyrenees, and Italy proper is cut off from Europe by the Apennine chain. On the other hand, it is along the line of the Danube and of its western affluent, the Save (see map between pages 614 and 615), that we find the geographical limits of the Balkan Peninsula. This boundary, as will be observed, excludes the kingdom of Roumania, seeming to distinguish it from its trans-Danubian neighbor Bulgaria. This is highly proper, viewed from the standpoint of geography and topography. For Roumania is, for the most part, an extensive and rich alluvial plain; while the Balkan Peninsula, as soon as you leave the Bulgarian lowlands, is characteristically rugged, if not really mountainous.



[\[Larger image\]](#)

From Adrianople west to the Adriatic, and from the Balkan Mountains and the Save River south to the plains of Epirus and Thessaly, extends an elevated region upward of two thousand feet above the sea, breaking up irregularly into peaks often rising above five thousand feet. There is no system in these mountains. The land is rudely broken up into a multitude of little "gateless amphitheatres," too isolated for union, yet not inaccessible enough for individuality. As White observes, "If the peninsula, instead of being the highly mountainous and diversified district it is, had been a plateau, a very different distribution of races would have obtained at the present day." Nor can one doubt for a moment that this disordered topography has been an important element in the racial history of the region.

In its other geographical characteristics this peninsula is seemingly more favored than either Spain or Italy. More varied than the former, especially in its union of the two flora of north and south; far richer in contour, in the possession of protected waters and good harbors than Italy;

the Balkan Peninsula, nevertheless, has been, humanly speaking, unfortunate from the start. The reason is patent. It lies in its central or rather intermediate location. It is betwixt and between; neither one thing nor the other. Surely a part of Europe, its rivers all run to the east and south. "By physical relief it turns its back on Europe," continually inviting settlement from the direction of Asia. It is no anomaly that Asiatic religions, Asiatic institutions, and Asiatic races should have possessed and held it; nor that Europe, Christianity, and the Aryan-speaking races should have resisted this invasion of territory which they regarded in a sense as their own. In this pull and haul between the social forces of the two continents we finally discover the dominant influence, perhaps, which throughout history has condemned this region to political disorder and ethnic heterogeneity.

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As little racial as of topographical system can we discover in this Balkan Peninsula. Only in one respect may we venture upon a little generalization. This is suggested by the preliminary bird's-eye view which we must take as to the languages spoken in the peninsula. This was a favorite theme with the late historian Freeman. It is developed in detail in his luminous writings upon the Eastern question. The Slavs have in this part of Europe played a rôle somewhat analogous to, although less successful than, that of the Teutons in the west. They have pressed in upon the territory of the classic civilizations of Greece and Rome, ingrafting a new and physically vigorous population upon the old and partially enervated one. From some center of dispersion up north toward Russia, Slavic-speaking peoples have expanded until they have rendered all eastern Europe Slavic from the Arctic Ocean to the Adriatic and Ægean Seas. Only at one place is the continuity of Slavdom broken; but this interruption is sufficient to set off the Slavs into two distinct groups at the present day. The northern one, of which we have already treated,^[7] consists of the Russians, Poles, Czechs, and Slovaks. The southern group, now before us, comprises the main body of the Balkan peoples from the Serbo-Croatians to the Bulgars, as shown upon the accompanying map. Between these two groups of Slavs—and herein is the significant point—is a broad belt of non-Slavic population, composed of the Magyars, linguistically now as always Finns; and the Roumanians, who have become Latin in speech within historic times. This intrusive, non-Slavic belt lies along or near the Danube, that great highway over which eastern peoples have penetrated Europe for centuries. The presence of this water way is distinctly the cause of the linguistic phenomenon. Rome went east; and the Finns, like the Huns, went west along it, with the result as described. Linguistically speaking, therefore, the boundary of the southern Slavs and that of the Balkan Peninsula, beginning, as we have said, at the Danube, are one and the same.

We may best begin our ethnic description by the apportionment of the entire Balkan Peninsula into three linguistic divisions, viz., the Greeks, the Slavs, and the Tatar-Turks. Of these the second is numerically the most important, comprising the Serbo-Croatians, the Albanians, and, in a measure, the Bulgarians. Their distribution is manifested upon our map, to which we have already directed attention. These Slavic-speaking peoples form not far from half the entire population. Next in order come the Greeks, who constitute probably about a third of the total. As our map shows, this Greek contingent is closely confined to the seacoast, with the exception of Thessaly, which, as an old Hellenic territory, we are not surprised to find Greek in speech to-day. The Slavs, contrasted with the Greeks, are primarily an inland population; the only place in all Europe, in fact, where they touch the sea is along the Adriatic coast. Even here the proportion of Greek intermixture is more considerable than our map would seem to imply. The interest of this fact is intensified because of the well-deserved reputation as admirable sailors which the modern Dalmatians possess. They are the only natural navigators of all the vast Slavic world. Everywhere else these peoples are noted rather for their aptitude for agriculture and allied pursuits. There is still another important point to be noted concerning the Greeks. They form not only the fringe of coast population in Asiatic as well as in European Turkey; they, with the Jews, monopolize the towns, devoting themselves to commerce as well as navigation. Jews and Greeks are the natural traders of the Orient. Thus is the linguistic segregation between Greek and Slav perpetuated, if not intensified, by seemingly natural aptitudes.

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Perhaps the most surprising feature of our map of Turkey is the relative insignificance of the third element, the Turks. There were ten years ago, according to Couvreur, not above seven hundred and fifty thousand of them in all European Turkey. Bradaska estimated that they were outnumbered by the Slavs seven to one. Our map shows that they form the dominant element in the population only in eastern Bulgaria, where they indeed constitute a solid and coherent body. Everywhere else they are disseminated as a small minority among the Greeks or Slavs. Even about Constantinople itself the Greeks far outnumber them. In this connection we must bear in mind that we are now judging of these peoples in no sense by their physical characteristics, but merely by the speech upon their lips. Nowhere else in Europe, as we shall soon see, is this criterion so fallacious as in the Balkan states. Religion enters also as a confusing element. Sax's original map, from which ours is derived, distinguishes these religious affiliations as well as language. He was indeed the first to employ this additional test. The maze of tangled languages and religions upon his map proved too complicated for our imitative abilities. We were obliged to limit our cartography to languages alone. The reader who would gain a true conception of the ethnic heterogeneity of Turkey should consult his original map.

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The word Turk was for several centuries taken in a religious sense as synonymous with Mohammedan,^[8] as in the Collect for Good Friday in its reference to "Jews, Turks, infidels, and heretics." Thus in Bosnia, where in the fifteenth century many Slavs were converted to Mohammedanism, their descendants are still known as Turks, especially where they use the Turkish speech in their religion. Obviously in this case no Turkish blood need flow in their veins.

It is the religion of Islam, acting in this way, which has served to keep the Turks as distinct from the Slavs and Greeks as they are to-day. Freeman has drawn an instructive comparison in this connection between the fate of the Bulgars, who, as we shall see, are merely Slavonized Finns, and the Turks, who have steadily resisted all attempts at assimilation. The first came, he says, as "mere heathen savages (who) could be Christianized, Europeanized, assimilated," because no antipathy save that of race and speech had to be overcome. The Turks, in contradistinction, came "burdened with the half-truth of Islam, with the half-civilization of the East." By the aid of these, especially the former, the Turk has been enabled to maintain an independent existence as "an unnatural excrescence" on this corner of Europe.

Even using this word as in a measure synonymous with religious affiliations, the Turks form but a small and decreasing minority in the Balkan Peninsula. Couvreur affirms that not over one third of the population profess the religion of Islam, all the remainder being Greek Catholics. This being so, the query at once suggests itself as to the reason for the continued political domination of this Turkish minority, Asiatic alike in race, in speech, and in religion. The answer is certain. It depends upon that subtle principle, the balance of power in Europe. Is it not clear that to allow the Turk to go under, as numerically he ought to do, would mean to add strength to the great Slavic majority, affiliated as it is with Russia both by speech and religion? This, with the consent of the Anglo-Saxon and other Teutonic rivals of the Slav, could never be allowed. Thus does it come about that the poor Greek is ground between the upper Turkish and the nether Slavic millstone. "Unnatural disunion is the fate of the whole land, and the cuckoo-cry about the independence and integrity of the Ottoman Empire means, among the other evil things that it means, the continuance of this disunion." Let us turn from this distressing political spectacle to observe what light, if any, anthropology may shed upon the problem.

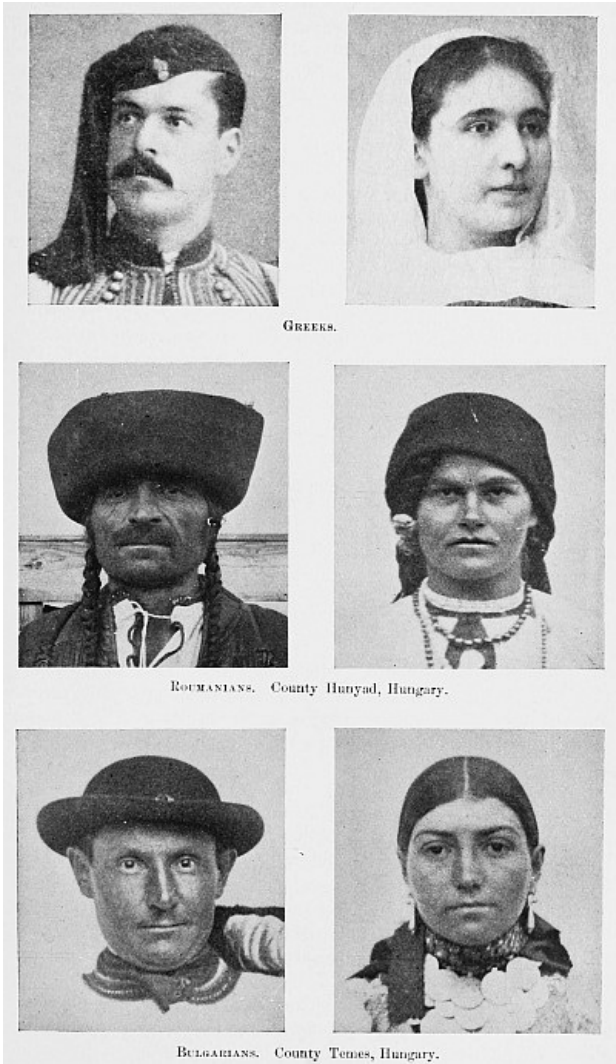
[Pg 618]

From the relative isolation of the Greeks at the extreme southern point of the peninsula and especially in the Peloponnesus, it would seem that they might be relatively free from those ethnic disturbances which have worked such havoc elsewhere in the Orient. Nevertheless, Grecian history recounts a continuous succession of inroads from the landward north, as well as from the sea. It would transcend the limits of our study to attempt any detailed analysis of the early ethnology of the country.^[9] Examination of the relationship of the Pelasgi to their contemporaries we leave to the philologists. Positively no anthropological data on the matter exist. We are sufficiently grateful for the hundred or more well-authenticated ancient Greek crania of any sort which remain to us. It is useless to attempt any inquiry as to their more definite ethnic origin within the tribal divisions of the country.^[10] The testimony of these ancient Greek crania is perfectly harmonious. All authorities agree that the ancient Hellenes were decidedly long-headed, betraying in this respect their affinity to the Mediterranean race, which we have already traced throughout southern Europe and Africa.^[11] Whether from Attica; from Schliemann's successive cities excavated upon the site of Troy; or from the coast of Asia Minor; at all times from 400 B. C. to the third century of our era; it would seem proved that the Greeks were of this dolichocephalic type. Stephanos gives the average cranial index of them all as about 75.7, betokening a people like the present Calabrians in head form; and, for that matter, about as long-headed as the Anglo-Saxons in England and America. More than this concerning the physical traits of these ancient Greeks we can not establish with any certainty. No perfect skeletons from which we can ascertain their statures remain to us. Nor can we be more positive as to their brunetness. Their admiration for blondness in heroes and deities is well known. As Dr. Beddoe ('93) says, almost all of Homer's favorites were blond or chestnut-haired, as well as large and tall. Lapouge^[12] seems inclined to regard this as proof that the Greeks themselves were of this type, a deduction which appears to us in no wise well founded.^[13] As we shall see, every characteristic in their modern descendants and every analogy with the neighboring populations leads us to the conclusion that the classical Hellenes were distinctly of the Mediterranean racial types, little different from the Phœnicians, the Romans, or the Iberians.

[Pg 619]

Since the Christian era, as we have said, a successive downpour of foreigners from the north into Greece has ensued.^[14] In the sixth century came the Avars and the Slavs, bringing death and disaster. A more potent and lasting influence upon the country was probably produced by the slower and more peaceful infiltration of the Slavs into Thessaly and Epirus from the end of the seventh century onward. A result of this is that Slavic place names to-day occur all over the Peloponnesus in the open country where settlements could readily be made. The most important immigration of all is probably that of the Albanians, who, from the thirteenth century until the advent of the Turks, incessantly penetrated the land. As a result the Albanian language is spoken to-day over a considerable part of the Peloponnesus, especially in its northeastern corner, where it attaches to the mainland. Only one little district has preserved, it may be added, anything like the original classical Greek speech. The Tzakons, in a little isolated and very rugged district on the eastern coast, include a number of classical idioms in their language. Everywhere else, either in the names of rivers, mountains, and towns, or in borrowed words, evidence of the powerful influence of the Slavic infiltration occurs. This has induced Fallmerayer, Philippson, and others to assert that the Slavs have in fact submerged the original Greeks entirely.^[15] Explicit rebuttal of this is offered by Hopf, Hertzberg, and Tozer, who admit the Slavic element, but still declare the Greeks to be Greek. This is a matter concerning which neither philologist nor geographer has a right to speak; the anthropological testimony is the only competent one. To this we turn.

The modern Greeks are a very mixed people. There can be no doubt of this fact from a review of their history. In despite of this, they still remain distinctly true to their original Mediterranean ancestry. This has been most convincingly proved in respect of their head form.^[16] The cephalic index of modern living Greeks ranges with great constancy about 81. This, it should be observed, betokens an appreciably broader head than in the case of the ancient Hellenes. Stephanos, who has measured several hundred recruits, finds dolichocephaly to be most prevalent in Thessaly and Attica; while broad-headedness, so characteristic, as we shall see, of the Albanians and other Slavs, is more accentuated toward the north, especially in Epirus. About Corinth also, where Albanian intermixture is common, the cephalic index rises above 83. The Peloponnesus has probably best preserved its early dolichocephaly, as we should expect. In Thessaly alone are the modern Greeks as purely Mediterranean as in classic times. There can be no doubt that in Asia Minor at least, the word Greek is devoid of any racial significance. It merely denotes a man who speaks Greek, or else one who is a Greek Catholic, converted from Mohammedanism. Greek, like Turk, has become entirely a matter of language and religion, as these people have intermingled. Thus in the southwest of Asia Minor, where Semitic influences have been strong, von Luschan^[17] makes the pregnant observation that the Greeks, in the main, look like Jews and speak Turkish. Here, then, is proof positive that no Greeks of pure Mediterranean descent remain to represent the primitive Hellenic type in that region. But it is equally certain that in the main body of the Greeks at home in Greece, the original racial traits are still in the ascendant. The smoothly oval and long faces in our two Greek portraits are surely of Mediterranean type. To this, the ideal form, the purest elements in the nation still tend to revert.



GREEKS.

ROUMANIANS. County Hunyad, Hungary.

BULGARIANS. County Temes, Hungary.

GREEKS.
ROUMANIANS. County Hunyad, Hungary.
BULGARIANS. County Temes, Hungary.

BALKAN STATES.

Whatever may be thought of the ancients, the modern Greeks are strongly brunet in all respects. Ornstein ('79) found less than ten per cent of light hair, although blue and gray eyes were characteristic of rather more than a quarter of his seventeen hundred and sixty-seven recruits. This accords with expectation, for among the Albanians, next neighbors and most intrusive aliens in Greece, light eyes are quite common. Weisbach's ('82) data confirm this, ninety-six per cent of his Greeks being pure brunets.^[18] In stature these people are intermediate between the Turks and the Albanians and Dalmatians, which latter are among the tallest of Europeans. In facial features Nicolucci's early opinion seems to be confirmed, that the Greek face is distinctively orthognathous—that is to say, with a vertical profile, the lower parts of the face being neither projecting nor prominent. The face is generally of a smooth oval, rather narrow and high,

especially as compared with the round-faced Slavs. The nose is thin and high, perhaps more often finely chiseled and straight in profile. The facial features seem to be well demonstrated in the classic statuary, although it is curious, as Stephanos observes, that these ideal heads are distinctly brachycephalic. Either the ancient sculptors knew little of anthropology, or else we have again a confirmation of our assertion that, however conscious of their peculiar facial traits a people may be, the head form is a characteristic whose significance is rarely recognized.

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Linguistically the pure Slavs in the Balkan states comprise only the Serbo-Croatians and the Albanians (see map), dividing between them the ancient territory of Illyria. This western half of the peninsula, rugged and remote, has been relatively little exposed to the direct ravages of either Finnic or Turkish invaders. Especially is this true of Albania. Nearly all authorities since Hahn are agreed in identifying these latter people—who call themselves Skipetars, by the way—as the modern representatives of the ancient Illyrians. They are said to have been Slavonized by the Serbo-Croatians, who have been generally regarded as descendants of the settlers brought by the Emperor Heraclius from beyond the Save. This he is said to have done in order to repopulate the lands devastated by the Avars and other Slavs who, Procopius informs us, first appeared in this region in the sixth century of our era. The settlers imported by Heraclius came, we are told, from two distant places: Old Servia, or Sorabia, placed by Freeman in modern Saxony; and Chrobatia, which, he says, lies in southwestern Poland. According to this view, the Serbo-Croatians are an offshoot from the northern Slavs, being divided from them to-day by the intrusive Hungarians, while the Albanians alone are truly indigenous to the country.

The recent political fate of these Illyrian peoples has been quite various, the Albanians alone preserving their independence continually under the merely nominal rule of the Turks. Religion, also, has affected these Slavs in various ways. Servia owes much of its present peace and prosperity to the practical elimination of the Moslems. Bosnia is still largely Mohammedan, with about a third of its people, according to White ('86), still professing that religion. The significance of this is increased, since it was mainly the upper classes in Bosnia, according to Freeman, who embraced the religion of Islam in order to preserve their power and estates. The conversion was not national, as in the case of the Albanians. Thus social and religious segregation work in harmony to produce discord. With multitudes of Jews monopolizing the commerce of the country and the people thus divided socially as well as in religion, the political unrest in Bosnia certainly seems to require the strong arm of Austrian suzerainty to preserve order.

Whatever the theory of the historians as to origins may be, to the anthropologist the modern Illyrians—Serbo-Croatians and Albanians alike—are physically a unit. Two characteristics render this ethnic group distinctive: first, that it comprises some of the tallest men in the world, comparing favorably with the Scotch in this respect; and, secondly, that the Illyrians tend to be among the broadest-headed people known. In general, it would appear that the people, of Herzegovina and northern Albania possess these traits to the most notable degree, while both in the direction of the Save and Danube and of the plains of Thessaly and Epirus they have been attenuated by intermixture. Presumably also toward the east among the Bulgarians in Macedonia and Thrace these characteristics diminish in intensity. Thus, for example, while the Herzegovinians, measured by Weisbach, yielded an average stature of five feet nine inches, the Bosnians were appreciably shorter; and the Dalmatians and Albanians were even more so. Nevertheless, as compared with the Greeks, Bulgars, Turks, or Roumanians, even the shortest of these Slavs stood high. From this specific center outward, especially around the head of the Adriatic Sea, over into Venetia, spreads the influence of this giantism. It confirms, as we have said, the classical theory of an Illyrian cross among the Venetians, extending well up into the Tyrol.

[Pg 623]

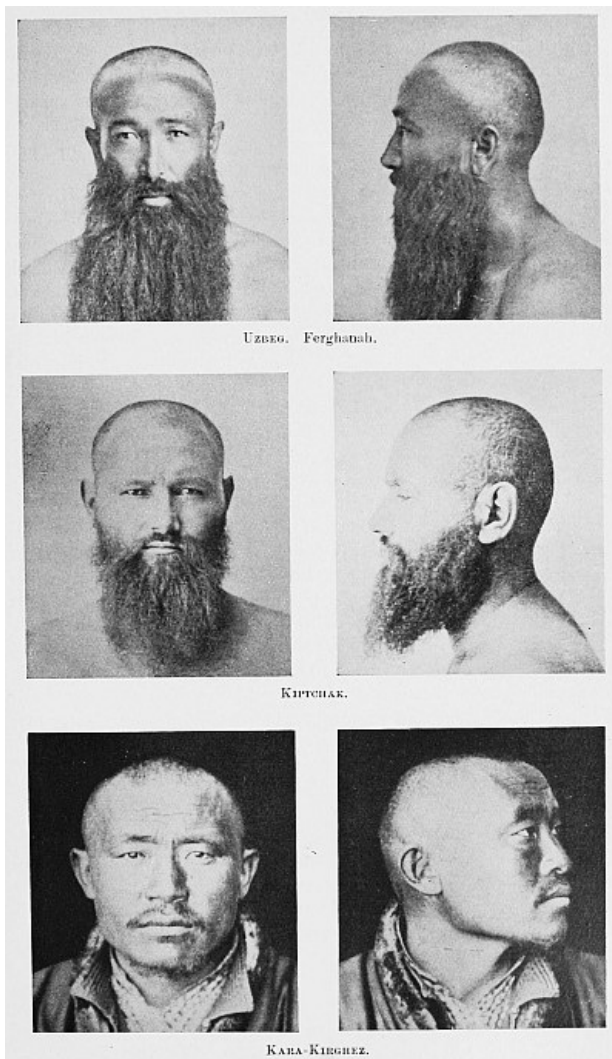
As for the second trait, the exaggerated broad-headedness, it too, like the tallness of stature, seems to center about Herzegovina and Montenegro. Thus at Scutari, in the corner of Albania near this last-named country, Zampa^[19] found a cranial index of 89; in Herzegovina the index upon the living head ranges above 87. It would be difficult to exceed this brachycephaly anywhere in the world. The square foreheads and broad faces of the people correspond in every way to the shape of the heads. Its significance appears immediately on comparison with the long oval faces of the Greeks.

One more trait of the Balkan Slavs remains for us to note. The people are mainly pure brunets, as we might expect, but they seem to be less dark than either the Greeks or the Turks. Especially among the Albanians are light traits by no means infrequent. In this respect the contrast with the Greeks is apparent, as well as with the Dalmatians along the coast and the Italians in the same latitude across the Adriatic. Weisbach found nearly ten per cent of blond and red hair among his Bosnian soldiers, while about one third of the eyes were either gray or blue. The Herzegovinians are even lighter than the Bosnians, almost as much so as the Albanians. From consideration of these facts it would appear as if the harsh climate of these upland districts had been indeed influential in setting off the inland peoples from the Italian-speaking Dalmatians along the coast. For among the latter brunetness certainly increases from north to south, conformably to the general rule for the rest of Europe. In the interior, blondness apparently moves in the contrary direction, culminating in the mountain fastnesses of northern Albania and the vicinity. On the whole, we find also in this trait of brunetness competent evidence to connect these Illyrians with the great body of the Alpine race farther to the west. We have another illustration of its

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determined predilection for a mountainous habitat, in which it stoutly resists all immigrant tendencies toward variation from its primitive type.

The Osmanli Turks, who politically dominate the Balkan Peninsula, notwithstanding their numerical insignificance, are mainly distinctive among their neighbors by reason of their speech and religion. Turkish is the westernmost representative of a great group of languages, best known, perhaps, as the Ural-Altai family.^[20] This comprises all those of northern Asia even to the Pacific Ocean, together with that of the Finns in Russian Europe. Its members are by no means unified physically. All varieties of type are included within its boundaries, from the tall and blond one which we may call Finnic, prevalent about the Baltic; to the squat and swarthy Kalmucks and Kirghez, to whom we have in a physical sense applied the term Mongols. The Turkish branch of this great family of languages is to-day represented in eastern Europe by two peoples, whom we may roughly distinguish as Turks and Tatars.^[21] The term Tatar, it should be observed, is entirely of European invention, like the similar word Hungarian. The only name recognized by the Osmanli themselves is that of Turk. This, by the way, seems quite aptly to be derived from a native root meaning "brigand," according to Chantre. They apply the word Tatar solely to the north Asiatic barbarians. By general usage this latter term, Tatar, has to-day become more specifically applied by ethnologists to the scattered peoples of Asiatic descent and Turkish speech who are mainly to be found in Russia and Asia Minor.



UZBEG. Ferghanah.
KIPTCHAK.
KARA-KIRGHEZ.

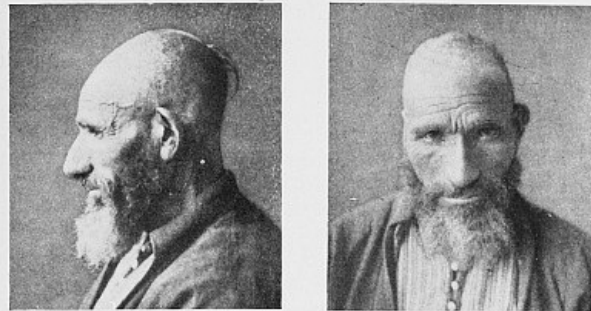
TURKOMAN TYPES.

Of the two principal physical types to-day comprised within the limits of the Ural-Altai languages, the Turks and Tatars seem to be affiliated with the Mongol rather than the Finn, not physically alone, but in respect of language as well. As a matter of fact, they are racially nearer the Aryan-speaking Europeans than most people imagine, in everything except their speech. Their nearest relatives in Asia seem to be the Turkoman peoples, who, to the number of a million or more, inhabit the deserts and steppes of western Asia. It was from somewhere about this latter region, as we know, that the hordes of the Huns under Attila, and those of Genghis Khan and Tamerlane, set forth to the devastation of Europe. The physical type of these inhabitants of Turkestan has been fairly well established by anthropologists. It persists throughout a great multitude of tribes of various names, among whom the Kara-Kirghez, Uzbeks, and Kiptchaks are

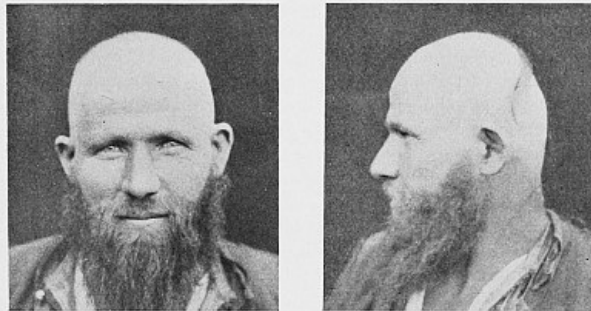
prominent.^[22] On page 625 we have portraits of these Turkoman types. The most noticeable feature of the portraits is the absence of purely Mongol facial characteristics. Except in the Kara-Kirghez the features are distinctly European. There is no squint-eye; the nose is well formed; the cheek bones are not prominent, although the faces are broad; and, most important of all, the beard is abundantly developed, both in the Uzbek and the Kiptchak. The Kara-Kirghez, on the other hand, betrays unmistakably his Mongol derivation in every one of these important respects. One common trait is possessed by all three—to wit, extreme brachycephaly, with an index ranging from 85 to 89. The flatness of the occiput is very noticeable in our portraits in every case, giving what Hamy calls a "cuboid aspect" to the skull. These portraits, if typical, should be enough to convince us that the Turkoman of the steppes about the Aral and Caspian Seas is far from being a pure Mongol even in his native land, although a strain of Mongol blood is apparent in many of their tribes.

The fact is that the Asiatic Turkomans, whence our Osmanli Turks are derived, are a highly composite type. A very important element in their composition is that of certain brachycephalic peoples of the Pamir, the Galchas and mountain Tadjiks. These are for all practical purposes identical with the Alpine type of western Europe. In their accentuated brachycephaly, their European facial features, their abundance of wavy hair and beard, and finally in their intermediate color of hair and eyes,^[23] these latter peoples in the Pamir resemble their European prototypes, or perhaps we had better say, congeners. So close is this affiliation that the occurrence of this type in western Asia is the keystone in any argument for the Asiatic origin of the Alpine race of Europe. The significance of it for us in this connection is that it explains the European affinity of many of the Turkoman tribes, who are more strongly European than Mongol in their resemblances. It is highly important, we affirm, to fix this in mind, for the prevalent opinion seems to be that the Turks in Europe have departed widely from their ancestral Asiatic type, because of their present lack of Mongol characteristics, such as almond eyes, lank black hair, flat noses, and high cheek bones.

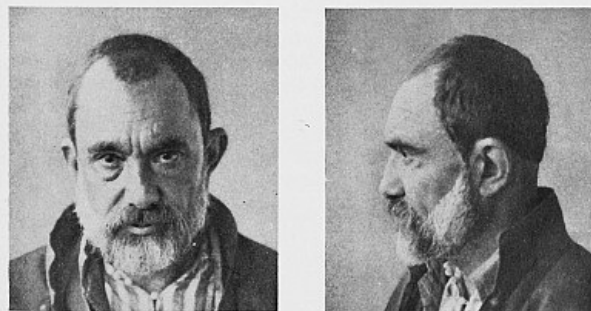
[Pg 627]



NOMAD IVERVEK. Lycia, Asia Minor.



TURK. Lycia, Asia Minor.



TURK. Lycia, Asia Minor.

NOMAD IVERVEK. Lycia, Asia Minor.

TURK. Lycia, Asia Minor.

TURK. Lycia, Asia Minor.

TURKS.

Either the Osmanli Turks were never Mongols, or they have lost every trace of it by intermixture. Our portraits on the opposite page give little indication of Asiatic derivation except in their accentuated short-and broad-headedness. This is considerably more noticeable in Asia Minor than in European Turkey.^[24] West of the Bosphorus the Turks differ but little from the

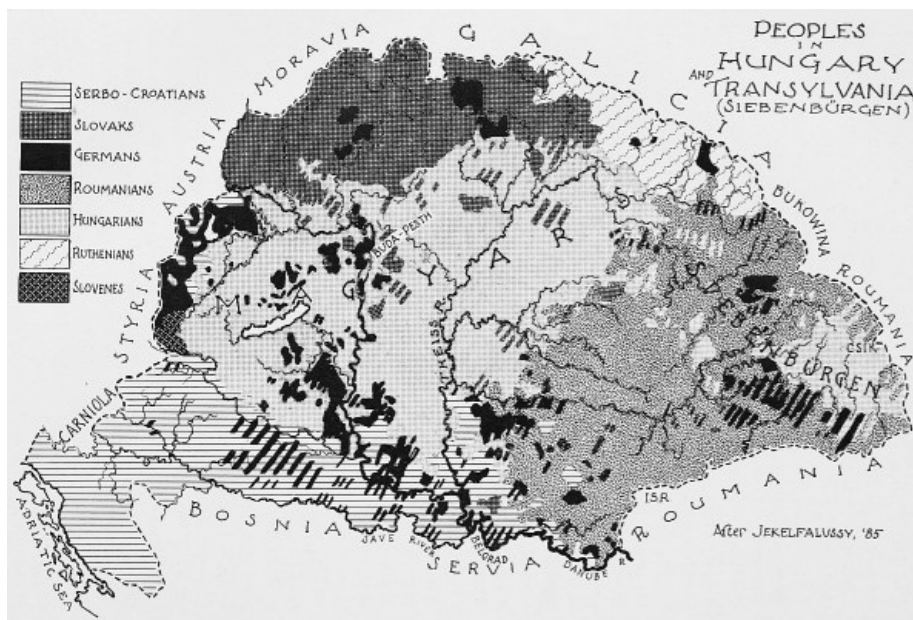
[Pg 628]

surrounding Slavs in head form. They have been bred down from their former extreme brachycephaly, which still rules to a greater degree in Asia Minor. In our portraits from this region the absence of occipital prominence is very marked. In addition to this, the Turks are everywhere, as Chantre observes, "incontestably brunet." The hair is generally stiff and straight. The beard is full. This latter trait is fatal to any assumption of a persistence of Kirghez blood, or of any Mongolic extraction, in fact. The nose is broad, but straight in profile. The eyes are perfectly normal, the oblique Mongol type no more frequent than elsewhere. In stature tallness is the rule, judging by Chantre's data, but in this respect social conditions are undoubtedly of great effect. On the whole, then, we may consider that the Turks have done fairly well in the preservation of their primitive characteristics. Chantre especially finds them quite homogeneous, considering all the circumstances. They vary according to the people among whom their lot is cast. Among the Armenians they become broader-headed, while among the Iranian peoples—Kurds or Persians—the opposite influence of intermixture at once is apparent.

The Bulgarians are of interest because of their traditional Finnic origin and subsequent Europeanization. This has ensued through conversion to Christianity and the adoption of a Slavic speech. Our earliest mention of these Bulgars would seem to locate them between the Ural Mountains and the Volga.^[25] The district was, in fact, known as Old Bulgaria till the Russians took it in the fifteenth century. As to which of the many existing tribes of the Volga Finns represent the ancestors of these Bulgarians, no one is, I think, competent to speak. Pruner Bey seems to think they were the Ostiaks and Voguls, since emigrated across the Urals into Asia; the still older view of Edwards and Klaproth made them Huns; Obédénare, according to Virchow, said they were Samoyeds or Tungus; while Howorth and Beddoe claim the honor for the Chuvashes. These citations are enough to prove that nobody knows very much about it in detail. All that can be affirmed is that a tribe of Finnic-speaking people crossed the Danube toward the end of the seventh century and possessed themselves of territory near its mouth. Remaining heathen for two hundred odd years, they finally adopted Christianity and under their great leaders, Simeon and Samuel, became during the tenth century a power in the land. Their rulers, styling themselves "Emperors of the Slavs," fought the Germans; conquered the Magyars as well as their neighbors in Thrace, receiving tribute from Byzantium; became allies of Charlemagne; and then subsided under the rule of the Turks. Since the practical demise of this latter power they have again taken courage, and in their semi-political independence in Bulgaria and northern Roumelia rejoice in an ever-rich and growing literature and sense of nationality.

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Bulgarian is spoken, as our map at page 614 indicates, far outside the present political limits of the principality—indeed, over about two thirds of European Turkey. Gopčević has made a brilliant attempt to prove that Macedonia, shown by our map and commonly believed to be at bottom Bulgarian, is in reality populated mainly by Serbs.^[26] The weakness of this contention was speedily laid bare by his critics. Political motives, especially the ardent desire of the Servians to make good a title to Macedonia before the disruption of the Ottoman Empire, can scarcely be denied. Serbia needs an outlet on the Mediterranean too obviously to cloak such an attempted ethnic usurpation. As a fact, Macedonia, even before the late Greco-Turkish war, was in a sad state of anarchy. The purest Bulgarian is certainly spoken in the Rhodope Mountains; there are many Roumanians of Latin speech; the Greeks predominate all along the sea and throughout the three-toed peninsula of Salonica, while the Turks are sparsely disseminated everywhere. And as for religion—well, besides the severally orthodox Greeks and Turks, there are in addition the Moslem and apostate Bulgarians, known as Pomaks, who have nothing in common with their Greek Catholic fellow-Bulgars, together with the scattering Pindus Roumanians and Albanians in addition. This interesting field of ethnographic investigation is, even at this late day, practically unworked. As Dr. Beddoe writes—and his remarks are equally applicable to Americans—"here are fine opportunities for any enterprising Englishman with money and a taste for travel and with sufficient brains to be able to pick up a language. But, alas! such men usually seem to care for nothing but 'killing something.'"



The Roumanians, or Moldo-Wallachians, are not confined within the limits of that country alone. Their language and nationality cover not only the plains along the Danube and the Black Sea, but their speech extends beyond the Carpathian Mountains over the entire southeastern quarter of Hungary and up into the Bukovina. Transylvania is merely a German and Magyar islet in the vast extent of the Roumanian nation. There are more than a third as many Roumanians as there are Magyars in the Hungarian kingdom, according to the census of 1890. Politically it thus happens that these people are pretty well split up in their allegiance. Nor can this condition be other than permanent. For the Carpathian Mountains, in their great circle about the Hungarian basin, cut directly through the middle of the nation as measured by language. This curious circumstance can be accounted for only on the supposition that the disorder in the direction of the Balkan Peninsula, incident upon the Turkish invasion, forced the growing nation to expand toward the northwest, even over the natural barrier interposed between Roumania proper and Hungary. Geographical law, more powerful than human will, ordains that this latter natural area of characterization—the great plain basin of Hungary—should be the seat of a single political unit. There is no resource but that the Roumanians should in Hungary accept the division from their fellows over the mountains as final for all political purposes.^[27]

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The native name of these people is Vlach, Wallach, or Wallachian. Various origins for the name have been assigned. Lejean asserts that it designates a nomad shepherd, in distinction from a tiller of the soil or a dweller in towns. Picot voices the native view as to ethnic origins by deriving the word Wallach from the same root as Wales, Walloon, etc., applied by the Slavs and Germans to the Celtic peoples as "foreigners." This theory is now generally discountenanced. Obédénare's attempt to prove such a Celtic relationship has met with little favor.^[28] The western name Roumanian springs from a similarly exploded hypothesis concerning the Latin origin of these people. To be sure, Roumanian is distinctly allied to the other Romance languages in structure. It is an anomaly in the eastern Slavic half of Europe. The most plausible explanation for this phenomenon, and one long accepted, was that the modern Roumanians were descendants of the two hundred and forty thousand colonists whom the Emperor Trajan is said to have sent into the conquered province of Dacia. The earlier inhabitants of the territory were believed to have been the original Thracians. Since no two were agreed as to what the Thracians were like, this did not amount to much. Modern common sense has finally prevailed over attempts to display philological erudition in such matters. Freeman expresses this clearly. Roumania, as he says, lay directly in the pathway of all invasions from the East; the hold of the Romans upon Dacia was never firm; the province was the first to break away from the empire; and finally proof of a Latinization only at the late date of the thirteenth century is not wanting. The truth seems to be that two forces were contending for the control of eastern Europe. The Latin could prevail only in those regions which were beyond the potent influence of Greece. Dacia being remote and barbarian, this Latin element had a fighting chance for survival, and succeeded.

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Our ethnic map at page 614 shows a curious islet of Roumanian language in the heart of the Greek-speaking territory of Thessaly. There is little sympathy between the two peoples, according to Hellène. The occurrence of this Roumanian colony, so far removed from its base, has long puzzled ethnographers. Some believe the peoples were separately Romanized *in situ*; others that they were colonists from Dacia in the ninth and tenth centuries. At all events, these Pindus Roumanians are too numerous—over a million souls—to be neglected in any theory as to the origin of their language.^[29] Another islet of quasi-Roumanian speech occurs in Istria, on the Adriatic coast. Its origin is equally obscure.^[30]

It is no contradiction that, in spite of the fact of our exclusion of Roumania from the Balkan Peninsula owing to its Latin affinities, thereby seeming to differentiate it sharply from Bulgaria, the latter of Finnic origin; that we now proceed to treat of the physical characteristics of the two nationalities, Roumanian and Bulgarian, together. Here is another example of the superficiality of language, of social and political institutions. They do not concern the fundamental physical facts of race in the least. At the same time we again emphasize the necessity of a powerful corrective, based upon purely natural phenomena, for the tendency of philologists and ethnographers to follow their pet theories far afield, giving precedence to analogies of language and customs over all the potent facts of geographical probability. Let us look at it in this light. Is there any chance that, on the opposite sides of the Danube, a few Finns and a few Romans respectively interposed among the dense population which so fertile an area must have possessed, even at an early time, could be in any wise competent to make different types of the two? There is nothing in our confessedly scanty anthropological data to show it, at all events. We must treat the lower Danubian plain as a unit, irrespective of the bounds of language, religion, or nationality.

It was long believed that the Bulgarians were distinctive among the other peoples of eastern Europe by reason of their long-headedness. All the investigations upon limited series of crania pointed in that direction. This naturally was interpreted as a confirmation of the historic data as to a Finnic Bulgarian origin very distinct from that of the broad-headed Slavs. Several recent discoveries have put a new face upon the matter. In the first place, researches by Dr. Bassanovitch, of Varna, upon several thousand recruits from western Bulgaria prove that in the west these Bulgarians even outdo many of the Balkan Slavs in their broad-headedness.^[31] At the same time it appears that the older authorities were right, after all, in respect of the eastern Bulgarians. Among them, and also over in eastern Roumelia, long heads are still the rule. The oval-faced Bulgarians among our portraits are probably of this dolichocephalic type. Their

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contrast facially with the broad-headed Roumanians is very marked. Thus it is established that the Bulgarian nation is by no means a unit in its head form. We should add also that, although not definitely proved as yet, it is highly probable that similar variations occur in Roumania. In the Bukovina brachycephaly certainly prevails. Our square-faced Roumanians on page 621 may presumably be taken to represent this type. This broad-headedness decreases apparently toward the east as we leave the Carpathian Mountains, until along the Black Sea it seems, as in Bulgaria, to give way to a real dolichocephaly.^[32]

How are we to account for the occurrence of so extended an area of long-headedness all over the great lower Danubian plain? Our study of the northern Slavs has shown that no such phenomenon occurs there among the Russians. It certainly finds no counterpart among the southern Slavs or the Turks. The only other people who resemble these Bulgars in long-headedness are the Greeks. Even they are far separated; and, in any event, but very impure representatives of the type. What shall we say? Two explanations seem to be possible, as Dr. Beddoe observes.^[33] Either this dolichocephaly is due to the Finnicism of the original Bulgars, or else it represents a characteristic of the pre-Bulgarian population of the Danube basin. He inclines with moderation to the former view. The other horn of the dilemma is chosen by Anutchin^[34] in a brilliant paper at the late Anthropological Congress at Moscow. According to his view—and we assent most heartily to it—this dolichocephaly along the Black Sea represents the last survival of a most persistent trait of the primitive inhabitants of eastern Europe. Referring again to our study of Russia,^[35] we would call attention to the occurrence of a similar long-headed race underlying all the modern Slavic population. We are able to prove also that such a primitive substratum occurs over nearly all Europe. It has been unearthed not far from here, for example, at Glasinac in Bosnia. When archæological research is extended farther to the east, new light upon this point may be expected. It will be asked at once why this primitive population should still lie bare upon the surface, here along the lower Danube, when it has been submerged everywhere else in Central Europe. Our answer is ready. Here in this rich alluvial plain population might, expectedly, be dense at a very early period. As we have observed before, such a population, if solidly massed, opposes an enormous resistance to absorption by new-comers. A few thousand Bulgarian invaders would be a mere drop in the bucket of such an aggregation of men. We are strengthened in this hypothesis that the dolichocephaly of the Danubian plain is primitive, by reason of another significant fact brought out by Bassanovitch.^[36] Long-headedness is overwhelmingly more prevalent among women than among men. The former represent more often what Bassanovitch calls the "dolichocephalic Thracian type." The oval-faced Bulgarian woman among our portraits would seem to be one of these. Now, in our treatment of the Jews,^[37] we have sought to illustrate the principle that in any population the primitive type persists more often in the women. The bearing of such a law in the case of the Bulgars would seem to be definite. Their long-headedness, where it occurs, must date from a far more remote period than the historic advent of the few thousand immigrants who have given the name Bulgaria to the country.

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As for the other physical traits of the Bulgarians and Roumanians there is little to be added. It goes without saying that they are both deep brunets. Obédénare says the Roumanians are very difficult to distinguish from the modern Spaniards and Italians. This is probably true in respect of brunetness. The Oriental cast of features of our portraits, on the other hand, can not fail to attract attention. More than two thirds of Bassanovitch's nineteen hundred and fifty-five Bulgarians were very dark-haired. Light eyes were of course more frequent, nearly forty per cent being classed as blue or greenish. A few—about five per cent—were yellow or tawny-haired, these individuals being at the same time blue-eyed. This was probably Procopius's excuse for the assertion that the Bulgars were of fair complexion. He also affirmed that they were of goodly stature. This is not true of either the modern Roumanians or Bulgars. They average less than five feet five inches in height,^[38] being considerably shorter than the Turks, and positively diminutive beside the Bosnians and other southern Slavs. The Bulgarians especially are correspondingly stocky, heavily boned and built. We may also affirm a real difference in temperament between the two nationalities, built up, as we assert, from the same foundation. The Wallachians are said to be more emotional and responsive; the Bulgarians inclined to heaviness and stolidity. Both are pre-eminently industrious and contented cultivators of the soil, with little aptitude for commerce, so it is said. We hesitate to pass judgment upon either in respect of their further aptitudes until fuller data can be provided than are available at the present time.

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MARVELOUS INCREASE IN PRODUCTION OF GOLD.

BY ALEXANDER E. OUTERBRIDGE, JR.

The increasing annual production of gold in the world is a matter of such far-reaching economic importance, not only in the financial affairs of nations, but also in their industrial progress and in their civilization, that a vast amount of patient study has been given by eminent statisticians to the subject, and much time expended in compiling, from various historical records and other sources of information, statistical data which can be confidently accepted as approximately correct, showing the annual production of the precious metal from the time of the discovery of America down to the present day.

A publication of the United States Treasury Department, issued in 1897, containing information respecting the production of precious metals, etc., gives statistical tables showing the annual production of gold in the world, commencing with the year 1493. The earlier records are taken from a table of averages for certain periods compiled by Dr. Adolph Soetbeer, and the later figures (from 1885 to 1896) are the annual estimates of the Bureau of the Mint. Other tables show the annual production of gold from the mines of the United States alone from 1845 to 1896, and it is from these official sources mainly that the information has been gathered for this article, supplemented, however, by a full and very interesting communication to the author from the Director of the Mint, giving the latest figures, not yet published, and containing the estimates and deductions of the director respecting the production of gold in the world in 1898. This information is so timely and valuable that the author is of the opinion that the courteous letter of the Director of the Mint in response to his inquiries, if appended to this article, may prove to be—like the postscript of a lady's correspondence—its most important feature.

Students of political economy are well aware of the fact that some theorists have maintained that the annual production of gold in the world (apart from the phenomenal discoveries in California about the middle of the century, which were of an ephemeral character) does not keep pace with the natural increase in trade requirements, if gold is to maintain its position as the standard measure of value and the universal medium of exchange. This theory, after having passed through the various stages of *pro* and *con* argument in academic theses, became the "war cry" of a political party in this country composed of heterogeneous elements in the community, all inspired with one common idea that the balance of power in commercial transactions had been destroyed by the overwhelming force of concentration of capital and the "cornering" of the visible supply of gold in the world by a few enormously wealthy bankers. It was shown that, while the average annual production of gold in the world in five years from 1855 to 1860 exceeded \$134,000,000, there was a constant decline thereafter, so that the annual average during five years from 1881 to 1885 barely exceeded \$99,000,000, according to official estimates; also that the annual gold product of the mines of the United States declined from a value of \$65,000,000 in 1853 to \$33,000,000 in 1892. Furthermore, although a rising tendency was observed in each subsequent year, the production from the mines of this country in 1894 was still under \$40,000,000, as was shown by the statistics of the United States Treasury Department.

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While admitting the general accuracy of these statements of fact, it is the purpose of this paper to endeavor to show that the conclusions drawn therefrom were entirely fallacious, because due cognizance was not taken of the wonderful progress that has been made in recent years in mining and metallurgical arts whereby countless millions of tons of ore containing gold in such a finely divided state, or in such a refractory condition, that it was formerly worthless (costing more to recover the gold than the value of the precious metal contained in the ore), have now rendered these low-grade ores the most stable sources of supply of gold. Metallurgists, having knowledge of these facts, have at various times during the past ten years predicted that a golden stream would soon begin to flow from these practically new and apparently inexhaustible sources; but the people at large were wholly incredulous, and they are now astounded at the magnitude of the production of gold in the world in the past two years; and more especially, perhaps, are they amazed at the increase of production in the United States, as shown by the official reports of the Director of the Mint.

The gold production of the world in 1897 amounted in value, according to the most reliable estimates, to more than \$237,000,000, and in 1898 to more than \$280,000,000; and it is the opinion of the Director of the Mint that the final compilation of figures will show that the production was "somewhere between \$290,000,000 and \$300,000,000!"

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Gold Production of the World.

Countries	1897.			1898.		
	Fine ounces.	Kilogrammes.	Value.	Fine ounces.	Kilogrammes.	Value.
<i>North America.</i>						
United States	2,774,935	84,870.5	\$59,210,795	3,110,788	95,200.7	\$64,300,000
Canada	299,467	9,164.0	6,190,000	686,502	22,071.1	14,190,000
Newfoundland	3,000	93.3	62,010	3,000	93.3	62,010
Mexico	344,498	10,715.0	7,121,189	365,032	11,354.0	7,668,866
Central America	25,399	789.9	525,000	25,399	789.9	525,000
<i>South America.</i>						
Argentina	15,235	473.8	314,907	15,235	473.8	314,907
Bolivia	3,144	98.0	65,000	3,144	98.0	65,000
Brazil	70,732	2,200.0	1,462,120	84,633	2,591.0	1,750,000
Chile	68,096	2,118.0	1,407,544	68,096	2,118.0	1,407,544
Colombia	188,679	5,868.7	3,900,000	188,679	5,868.7	3,900,000
Ecuador	6,430	199.9	132,900	6,430	199.9	132,900
Guiana (British)	101,505	3,156.9	2,098,098	88,617	2,756.0	1,861,393
Guiana (Dutch)	32,983	1,025.8	681,748	28,273	865.3	584,421
Guiana (French)	59,859	1,861.7	1,237,310	66,593	2,038.0	1,376,477
Peru	5,787	180.0	119,628	5,787	180.0	119,628
Uruguay	6,880	214.0	114,600	6,880	214.0	114,600

Venezuela	39,384	1,224.9	814,067	39,384	1,224.9	814,067
<i>Europe.</i>						
Austria-Hungary	105,397	3,278.2	2,178,556	105,397	3,278.2	2,178,556
France	10,513	327.0	217,304	10,513	327.0	217,304
Germany	90,921	2,780.9	1,879,357	90,921	2,780.9	1,879,357
Italy	10,325	316.0	213,431	10,325	316.0	213,431
Norway	650	20.0	13,508	653	20.0	13,508
Russia	1,046,965	32,408.2	21,538,490	1,216,100	37,217.0	25,136,994
Sweden	3,702	133.3	76,524	3,702	133.3	76,524
Turkey	387	12.0	8,000	387	12.0	8,105
United Kingdom	2,032	62.5	42,001	2,032	62.5	42,001
<i>Asia.</i>						
China	321,296	9,992.8	6,641,190	321,296	9,992.8	6,641,190
India (British)	353,147	10,983.4	7,299,554	369,018	11,479.3	7,753,150
Japan	34,509	1,073.3	713,300	34,509	1,073.3	713,300
Korea	34,918	1,086.0	721,765	34,918	1,086.0	721,765
Malay Peninsula	25,000	777.6	516,750	25,000	777.6	516,750
Borneo	4,837	150.6	100,000	4,837	150.6	100,000
<i>Africa.</i>						
Witwatersrand	2,511,544	78,112.6	51,913,607	3,554,746	108,790.0	73,476,600
Other districts, S. A. R.	232,466	7,230.0	4,805,072	229,528	7,024.3	4,744,350
West Coast	24,276	755.0	501,793	24,276	742.9	501,793
Rhodesia	10,000	306.3	206,700
Madagascar	19,351	601.8	400,000	19,351	601.8	400,000
Australasia, 7 colonies	2,520,333	77,130.6	52,095,338	2,945,426	91,024.7	61,480,763
Totals	11,399,475	351,486.2	\$237,332,456	13,805,407	425,333.1	\$286,218,954

The above table, showing the estimated production of gold from all parts of the world in 1897 and 1898, is abstracted from the Annual Statistical Number of the Engineering and Mining Journal (January 1, 1899), and, although these figures may differ somewhat from those of the Director of the Mint, and from the final compilations, they are believed to be not very far from truth.

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It will be seen that the principal countries contributing to the grand total in both years were Africa, the United States of America, Australasia, Russia, Canada, Mexico, and India, the names being given in the order of the respective importance of these countries as gold producers in 1898.

It may surprise many readers to observe that India is placed at the foot of the list, for we are accustomed to associate India with gold, Mexico with silver, and Russia with platinum; and it may also prove a surprise to find that the contribution of the Klondike region, which has created such a great sensation, is so trifling as compared to the grand total. In 1897 the Klondike was credited with an output of less than \$3,000,000, and in 1898 of a little over \$10,000,000.

It will be observed in the estimates of the Government's agents (January 1, 1899) of the production of gold in the United States for 1898 (see the letter of the Director of the Mint, appended hereto) that the gold production of the State of Colorado was more than twice that of the Klondike region, and the production of California was nearly fifty per cent greater than that of the Klondike.

Other surprising facts crop out in studying in detail the increasing production of gold, more especially in the United States. For example, California has always been regarded as pre-eminently the gold-giving State, and until 1897 she led all the other States in the value of gold annually produced. Colorado, on the other hand, was equally famous as a silver-producing State, and while still holding this leading position she has actually passed California in the production of gold. Colorado has thus taken the lead over all the States in the production of gold and silver.

The output of gold in the United States in 1898 was more than twice that of 1890; and the production of gold in the world in 1898, at the lowest estimate, was much more than twice the estimated production in 1890. In the decade just prior to the California gold discoveries, in 1849, the average annual production in the world is estimated to have been less than \$13,500,000. In the previous decade it was less than \$10,000,000. Assuming these figures of Dr. Adolph Soetbeer (which are accepted by the nations of the world, and incorporated in many official documents) to be approximately correct, it appears that the estimated production of gold in the world in the first third of the present century was but little more than the production in the single year 1898!

It is, indeed, difficult to comprehend the full significance of these figures at a glance: the production of gold in the past five years has amounted to more than \$1,100,000,000; and if production should increase during the next five years in anything like the ratio of the past five years, it may be that a new economic problem, the very antithesis of that alluded to in the commencement of this paper, may present itself for solution. At all events, the cry of the Populists and others that increasing scarcity of gold is the cause of much of the poverty and of

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other ills of mankind, must surely be drowned in the golden stream now flowing from all quarters of the globe, almost threatening to become a rushing torrent, dangerous to the stable foundations of the world's commerce. That this, however, fortunately is an imaginary danger will appear from the following arguments:

Modern gold-getting by scientific methods compels the permanent investment of an enormous amount of capital, and a moderate return only in dividend is looked for as a rule; thus the balance between acquisition and disbursement is likely to be maintained in the future.

One of the chief causes of the extraordinary increase of production in very recent years is to be found in the application of the "cyanide process" to the recovery of gold from "tailings." This process is also largely applied to obtaining gold from very low-grade ores, that, in some cases, contain an average of less than one quarter of an ounce of gold distributed throughout a ton of ore! At the present time there are about twenty-five cyanide plants in this country, and over forty in the Transvaal, where the process has received its greatest development.

Although the fact that cyanide of potassium would dissolve gold quite readily was known long ago, having been employed by Faraday in his experiments with thin films of transparent gold, and used very extensively in the making of solutions of gold for electroplating baths during fifty years past, the practical application of the solvent to obtaining gold from low-grade ores is less than ten years old.

In Utah there is a dry bed of an ancient lake, the floor of which may be said to be carpeted with gold; according to a recent report this bed of limestone, eight miles by ten, varying from twenty to forty feet in thickness, and containing gold in proportion running from six to twenty dollars per ton, is an "ideal ore" for treatment by the cyanide process. A number of cyanide mills are now working the deposit, all paying dividends, and it is said that the only limit to output is the capacity of the mills. It is estimated that there are "5,000,000,000 tons of ore in the district, containing \$50,000,000,000 worth of gold!" Although this statement is startling, the estimate is not a wild guess, for the blanket of ore has been cut in many places; hundreds of samples have been taken from different depths, and in all cases the finely distributed gold has been found, apparently having been deposited from solution in a mineral water which formed the lake in prehistoric times.

A similar deposit of silver was found in New Mexico about twenty years ago and was christened the "Silver Lake" Mine. This was worked profitably until the great fall in price of silver made the operation a losing one. The "blanket" still contains millions of ounces of silver, and it is probable that cheaper methods of recovering the metal from the ore will be devised whenever the price of silver shall have fallen low enough to enable it to take its place among the so-called "economic" metals, having far wider application in the arts than have the precious metals. At present silver holds an unfortunate place "betwixt and between" the precious and the economic metals.

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Twenty years ago aluminum was more valuable than silver is to-day, and its production was correspondingly limited. Last year the price was reduced to a point which so widely extended its use that the production increased from 1,900 pounds in 1888 to more than 5,000,000 in 1898.

Although the gold deposit in the Camp Floyd district in Utah already alluded to may actually contain several billions of dollars' worth of gold, it will cost some billions of dollars' worth of labor and capital to recover the precious metal and will consume much time in the process; so that there is little reason to fear that gold will become so plentiful on account of this discovery that it will cease to be regarded as a precious metal. About forty years ago the assayers of the United States Mint announced that the clay underlying the city of Philadelphia contained more gold than had been brought from California and Australia, and this remarkable statement has never been disproved or even questioned. The gold, however, still remains locked fast in the clay, and the value of the precious metal has not yet fallen in consequence of the announcement of this old discovery. At that time the idea of profitably recovering gold from low-grade ores had not been born, and it is an interesting fact to note that in California gold is now being obtained from clay (by hydraulic washing methods) in which there is but little more than the average proportion of gold to the ton that the assayers found in the clay under the streets of Philadelphia. This does not prove, however, that it will now pay to excavate under the streets of the Quaker City, and undermine the buildings in order to wash out this gold, and until Philadelphia shall be provided with a far more copious water supply the most sanguine or suave promoter of great undertakings would find it impossible to obtain subscriptions to any scheme to recover this fugitive gold, or even, perhaps, difficult to give away shares of stock to influential individuals either in or out of councils.

An impression has prevailed that the production of gold in South Africa attained its maximum point in 1897, and that thenceforth the annual output would be smaller. On account of this fear the "Kaffirs" (South African gold-mining stocks) suffered a decline in the London stock market some months ago, but the statistics showed that the output during the first half of 1898 was larger than in the previous half year, and in the latter months of the year the increase was even more pronounced.

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In an address given before the Mining and Metallurgical Section of the Franklin Institute on Mining and Minting of Gold and Silver in November last, the writer said that the production of gold in South Africa in 1898 would not fall far short of \$70,000,000, and would probably be nearer \$80,000,000. The estimate of the Director of the Mint fixes the amount almost at the latter figure. The United States, in spite of the considerable increase over 1897, takes second

place as a world's producer of gold, Africa having contributed in 1898 an amount equal to that of the United States and Canada (including the Klondike) combined.

The startling announcements of discoveries of virgin gold in the Klondike and of rich placer gold deposits in other localities have had little to do with the enormous increase in production of gold in the world in recent years, though formerly such discoveries constituted the main source of supply of the precious metal. Digging for nuggets is a lottery pure and simple, in which a few prizes are obtained and many losses are suffered. It is said that for every dollar in gold taken out of the Klondike to date, two dollars have been carried in, and this is perhaps a conservative estimate. In fact, it is easy to prove by figures, if the value of labor be counted even at the lowest wage rate, say one dollar per diem, that far more money has been lost by the many gold-seekers than has been gained by the few fortunate ones in this twentieth-century search for the golden fleece.

The business of extracting gold from low-grade ores by scientific methods on a large scale, where the precious metal is evenly distributed throughout the matrix or gangue, is a legitimate field for the investment of capital, because the element of chance is reduced to a minimum, and even may be eliminated altogether. The margin of profit per ton of ore is not large as a rule in these operations, and thus the stability of value of the product is assured, whatever the output may be.

"TREASURY DEPARTMENT, BUREAU OF THE MINT,
"WASHINGTON, D. C., *February 1, 1899.*

"Alexander E. Outerbridge, Jr., Philadelphia, Pennsylvania.

"SIR: In answer to the inquiries in your letter of January 31st, I take pleasure in sending you such information on the production of gold in the principal gold-producing countries in 1898 as is at this early day available, comparing it with the gold output of the same countries in 1897. And first of the United States:

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"Inclosed you will find an estimate made by the agents of the bureau of the gold yield of the several States and Territories in 1898. The aggregate outturn was \$65,782,667. It must be clearly borne in mind that this is only an *estimate*, not the ascertained actual production. In 1897 the gold product of the United States was \$57,363,000. Assuming the estimate of the gold product of the United States in 1898 to be correct, there was an increase in the latter year over the gold yield of 1897, in round numbers, of \$8,420,000.

"The gold product of the Witwatersrand in 1898 was 4,295,602 ounces crude, and of the whole of the South African Republic 4,555,009 ounces crude, representing a value of \$79,801,025.

"As the gold product of the Transvaal in 1897 was \$57,633,861, the increase in 1898 was \$22,167,164. The figures here given are those published in all the leading papers interested in such matters in England and on the European continent. They are not, any more than the figures given below, official to the Bureau of the Mint.

"I have not yet seen any figures of the total gold product of Australia in 1898, but the output of five out of the seven colonies has been published. The figures are as follows:

	1897.	1898.
	Ounces crude. Ounces crude.	
New South Wales	292,217	341,722
New Zealand	251,645	280,176
Queensland	805,928	918,100
Victoria	812,765	837,258
West Australia	674,994	1,050,183
	-----	-----
Total	2,837,549	3,527,439
		2,837,549

		689,890

"There was an increase in the gold product of these five colonies of \$13,107,910, the ounce crude averaging about \$19 in value. The total gold product of Australia in 1898 was, as I estimate it, about \$67,792,000. In 1897 it was \$55,684,182. As yet no figures of the gold output of the two Australian colonies—Tasmania and South Australia—have come under my observation.

"Persons not connected with the bureau, but whose opinions are entitled to respect, have estimated the increase in India's gold output in 1898 at about \$500,000, and in that of Canada (including the Klondike) at \$8,000,000. I have thus far no data on which to predicate an increase or decrease in the gold yield of Russia. The product of these last-mentioned countries in 1897 was:

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India	\$7,247,500
Canada	6,027,100

"The increase in the principal countries mentioned above, of their gold product in 1898 over 1897, reduced to a table, gives a total of \$52,195,000, as follows:

United States	\$8,420,000
South African Republic	22,167,000
Australia	13,108,000
Canada	8,000,000
India	500,000

Total	\$52,195,000

"The world's product in 1897 was \$237,504,800. In 1898 it will probably not be less than \$289,699,800. My opinion is that it will be somewhere between \$290,000,000 and \$300,000,000.

"If any further information reaches me within a week or two, I shall be glad to communicate it to you.

"Respectfully yours,
"GEORGE E. ROBERTS, *Director of the Mint.*"

Agents' Estimate, January 1st, of the Production of Gold in the United States for 1898.

States and Territories.	Gold.
Alaska	\$2,039,930
Arizona	3,185,490
California	14,883,721
Colorado	24,500,000
Idaho	2,273,902
Michigan	65,000
Montana	5,209,302
Nevada	2,959,731
New Mexico	360,000
Oregon	1,343,669
South Dakota	5,841,406
Texas	7,500
Utah	2,170,543
Washington	599,483
Wyoming	5,168
South Appalachian States	337,832

Total	\$65,782,677

THE CALIFORNIA PENAL SYSTEM.

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By CHARLES HOWARD SHINN.

Theoretically every new commonwealth in organizing its institutions can measurably avoid the errors of older communities, and can venture upon promising experiments elsewhere untried. In practice, however, new States are usually compelled to face unforeseen difficulties, and although their various departments gain something in flexibility, they lose in systematic organization. They have the faults as well as the virtues of the pioneer.

Penology, like every other department of human thought, is a battlefield of opposing principles. But I know of nothing in print more inspiring to the officers of the State engaged in prison and reform work than Herbert Spencer's Essay on Prison Ethics. It is likely that many of the people who should read it are not aware of its value and interest to themselves. Beginning at the foundations, Mr. Spencer makes a lucid exposition of the necessity of "a perpetual readjustment of the compromise between the ideal and the practicable in social arrangements." As he points out, gigantic errors are always made when abstract ethics are ignored.

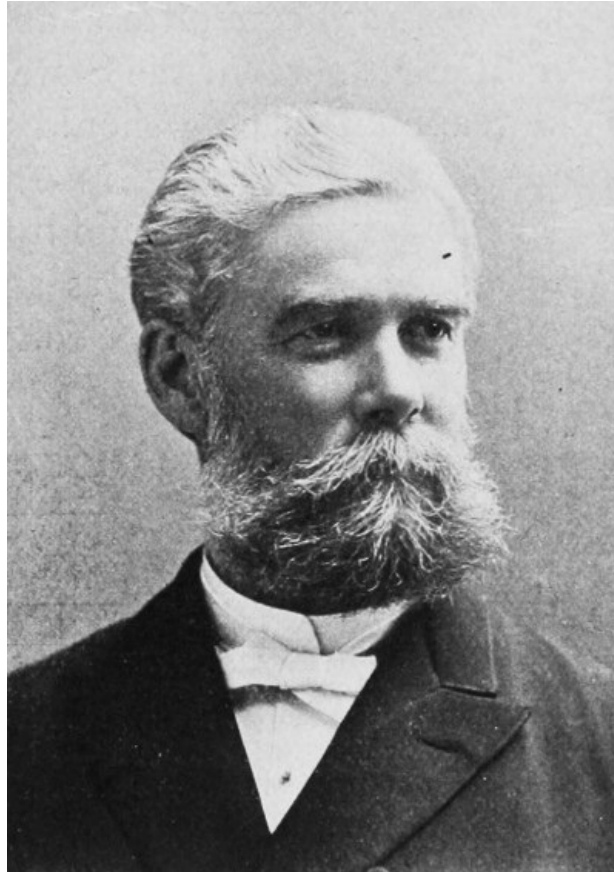
If society has the right of self-protection, it has, as Mr. Spencer asserts, the right to coerce a criminal. It has authority to demand restitution as far as possible, and to restrict the action of the offender as much as is needful to prevent further aggressions. Beyond this point absolute morality countenances no restraint and no punishment. The criminal does not lose all his social rights, but only such portion of those rights as can not be left him without danger to the welfare of the community.

But absolute morality also requires that while living in durance the offender must continue to maintain himself. It is as much his business to earn his own living as it was before. All that he can

rightfully ask of society is that he be given an opportunity to work, and to exchange the products of his labor for the necessaries of life. He has no right to eat the bread of idleness, and to still further tax the community against which he has committed an aggression. "On this self-maintenance equity sternly insists." If he is supported by the taxpayers the breach between himself and the true social order is indefinitely widened.

Such principles as these could easily have been made a fundamental part of the California prison system when the State was organized, for the famous Code of Reform and Prison Discipline, prepared about 1826 by a New Orleans lawyer, Edward Livingston, was well known to some of the ablest men of pioneer California, and a strong effort was made to obtain its adoption in complete form. That remarkable code known as the Livingston system agrees with the Spencerian principles of ethics, and has been a source of inspiration for the most advanced penal legislation of recent years. Louisiana adopted it only in part, but Belgium has the Livingston code in its entirety. California, suffering under difficult local conditions, took a course in the liberal pioneer days that has for a time rendered progress along the lines of modern development extremely difficult.

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WARDEN W. E. HALE, of San Quentin.

California is a large and populous State, many portions of which are thinly settled and hard to reach. In early days it had many Spanish and Mexican outlaws, and became a refuge for criminals from all parts of the world. When the State was organized, money was extremely abundant, and every one had golden dreams. The idea of self-supporting prisons seemed absurd, not only because the rich young State seemed capable of supporting any expense, but also because no manufactures were yet established, and the most active penologist would have found it hard to find suitable employment for prisoners.

As time went on, the very strong labor unions of California, aided by many newspapers and politicians, accepted the principle that every dollar a convict earned was taken from some citizen, and that the State was bound to support its criminals in idleness. Numbers of good and earnest men in the service of the State as prison commissioners, wardens, and other officials studying methods elsewhere and mindful of local conditions, have made untiring efforts to stir the public conscience, and to gain recognition of a criminal's right to earn his own living by productive labor. As long ago as 1872 Hon. E. T. Crane, of Alameda County, chairman of a joint Assembly and Senate committee, made an excellent and progressive report on prison reforms. Something has been gained since then, and, though working under adverse conditions, the prisons have been excellently managed. But these results are due to individuals, not to the system, nor to the well-meant but often injurious enactments of legislatures meeting biennially for only sixty days.

Under the system of biennial State appropriations, nearly all institutions suffer at times from mistaken kindness, and at other times from undue parsimony. Since there is no general supervising board for the two State prisons and the two State reform schools, and no settled ratio of appropriation based upon the number of inmates, the friends of each institution naturally do their best to obtain as large appropriations as possible from each new legislature. Hence arise special visiting committees and combinations between legislators from different parts of the State to "take care of" institutions whose regular annual income should not be dependent in the

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least upon politics.

The appropriations made by the last two legislatures for all purposes connected with prisons and reform schools, including salaries of officials, are shown in the following table:

State Appropriations from July 1, 1895, to July 1, 1899 (Forty-seventh to Fiftieth Fiscal Years, inclusive).

NAME OF INSTITUTION.	Sum granted.	Average yearly grants.
San Quentin Prison	\$615,153.40	\$153,788.35
Folsom Prison	488,000.00	109,500.00
Preston School of Industry	237,000.00	59,250.00
Whittier State School	403,000.00	100,750.00
Transportation of prisoners	150,000.00	37,500.00
Totals	\$1,848,153.40	\$460,988.35

Some small appropriations for improvements are necessarily included in these totals, but nothing more than may be expected every year or two. It is proper to rate the average annual expense of these institutions at nearly half a million dollars, nor can this sum be materially reduced until the State accepts the fundamental principle that prisons should be made nearly or quite self-supporting.

San Quentin was once managed to some extent on the contract system. Furniture-makers and other manufacturers paid half a dollar a day for each convict employed, and at one time as many as eight hundred men were thus utilized, giving the prison an income of twenty-four hundred dollars a week. The system was so violently attacked by labor unions that it was finally abandoned, and now I am told that convict-made furniture, stoves, and other articles such as were formerly made at San Quentin are brought to California from Joliet, Illinois, and other places by the carload.

Having abandoned the contract system, the State decided to make jute bags, chiefly for grain, and to sell them as nearly as possible at cost direct to the consumers, so as to help the agricultural classes. Machinery costing \$400,000 was obtained in England, and after many difficulties a factory was established at San Quentin. The price of raw material fluctuates greatly, and the mill has sometimes lost money, sometimes made a somewhat nominal profit. During the fiscal year ending June 30, 1891, for instance, 2,574,254 pounds of goods were manufactured at a total operating expense of \$160,684.07, and were sold at a price which nominally gave \$40,275.07 profit. But no sinking fund was allowed for, to cover wear and tear of machinery, nor did the operating expenses include even the maintenance of the convicts while at work. The following fiscal year the profit estimated in the same way was \$39,293.18. During the fiscal year 1893-'94 the loss on the jute mill was \$14,660.22; in 1894-'95 there was a profit of \$6,670.56; and in 1895-'96 a loss of \$12,288.45.

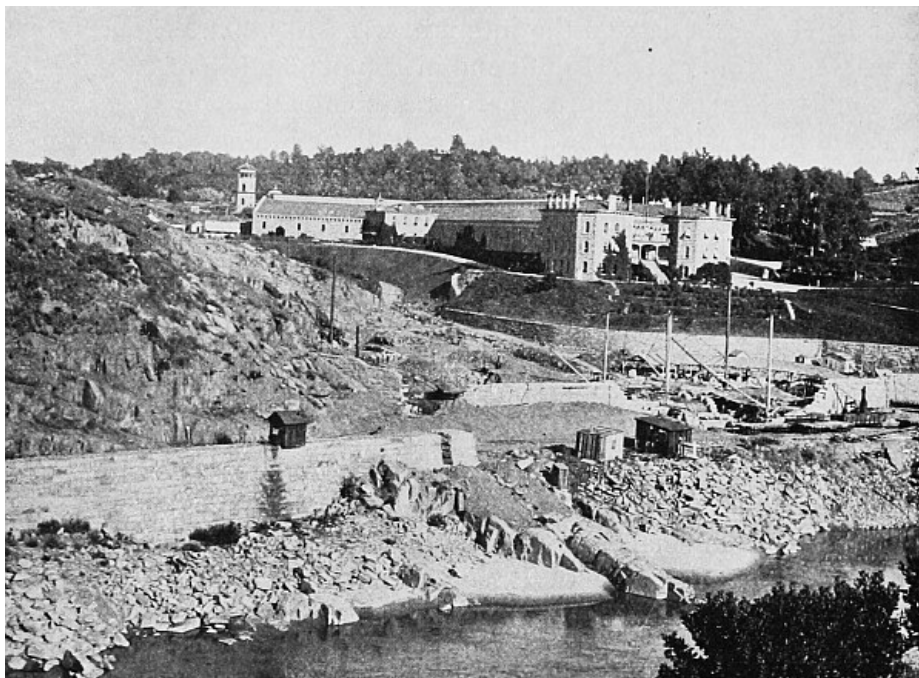
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In five years, therefore, there was nominally a profit of about \$60,000 in this department, but since neither interest, sinking fund, nor maintenance of the laborers is included among the expenses, the system can be looked upon only as a means of giving needed exercise to the prisoners and cheap grain sacks to the farmers. Financially it is a burden to the taxpayers. The old contract system had its drawbacks, but it at least afforded a profit, and gave convicts a chance of learning something about certain trades at which they could perhaps work when released; the jute mill not only offers no such opportunity, but is in other ways peculiarly unfit for modern prison requirements, since all operations in such mills can be stopped or delayed by the misbehavior of a few operatives. Far better are industries wherein small groups or individuals are engaged in various separate minor operations. Besides this, the sacks made by prison labor will probably have only local uses hereafter, because of a recent act of Parliament which is held to prevent wheat shipments in such sacks.

The Folsom Prison owns a magnificent water power and enormous quarries of granite. Between 1888 and 1894 convict labor amounting to 683,555 days were expended upon a dam, canal, and powerhouse, and over 2,000 horse power can already be used. About 250 horse power is now utilized by the prison for electric lights, ice manufacture, and other purposes. The quarries are being worked to some extent, and crushed rock for roads is sold at cost or nearly so. There is a farm that supplies many articles at less cost than if purchased in the market. At Folsom, as at San Quentin, the authorities do all in their power to economize, and to utilize convict labor, but the policy of the State prevents definite progress.

Meanwhile the reports of the prison directors and wardens and the messages of Governors have urged in the strongest terms a change. The biennial report of 1892-'93 and 1893-'94 says respecting the great Folsom water power: "If we can use this power solely with regard to profitable results to the State, we can return each year a surplus into the State treasury. We do not think that the State should refrain from working its convicts or utilizing its advantages because it may have some effect upon other businesses. All over the United States prisoners are engaged in manufacturing, and our investigations lead us to believe that the effect of prison competition, so called, is greatly overestimated."

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FOLSOM STATE PRISON.

The biennial report of 1894-'95 and 1895-'96 returns to the subject, states that the jute mills can not be a success under the restrictions of the present law, and urges that they should be run on a business basis, for a profit. It continues, "One source of profit would be to make use of the granite owned by the State" (at Folsom). It suggests a consolidation of the two prisons at Folsom, where, with prison labor and free power, and granite on the ground, a model prison could be constructed. Warden Aull, of Folsom Prison, in discussing the subject in 1896, said that for nine years the improvements there have employed the convicts, but now some new scheme must be devised. "The convicts must be kept at work. Every consideration of discipline, economy, reformation, and health demands this." But he believes that it will not pay the State to make shoes, blankets, clothing, brooms, tinware, etc. (as has been suggested at various times) for the eight thousand inmates of our State institutions. There are over two thousand convicts at Folsom and San Quentin. Only a small part of these, he says, could be utilized in making goods for State institutions, nor would there be any profit unless manufacturing was on a large scale for the outside markets as well. The experiment that New York is making will be watched with much interest here.

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The California labor unions recently adopted resolutions favoring "the quarrying of stone by convict labor, and the placing it upon market undressed at a low figure, in order to give employment to stone-cutters, stone-masons, and others employed on buildings." The State rock-crushing plant, if kept running, will utilize the labor of about two hundred and fifty convicts. Any advance beyond this point means open war with all the labor unions.

Evidently the time when the prisons of California are to be entirely self-supporting is still remote, and the public as well as the union need much more education upon the subject. Some reduction of expenses, together with any utilization of convict labor that indirectly benefits a few classes, is all that can be hoped for at present, but ultimately the reformation of the criminal by making him capable of self-support as well as anxious to live in peace with society, will be recognized as the aim of wise penal legislation.

There is no doubt but that many profitable industries can be found, as yet unnaturalized in California, and therefore coming only incidentally into competition with existing industries, but well adapted to prison labor. One of these industries is the growth and preparation of osier willows of many species, and their manufacture into many useful forms, especially into baskets for fruit pickers and for wine makers. Another possible industry is the growth and preparation of various semitropic species of grasses and fiber plants, from which hat materials, mattings, the baskets used in olive-oil manufacture and a multitude of other articles can be made. The sale of crushed rock at Folsom should, of course, be at a price which at least pays for the sustenance of the convicts employed. The enormous water power of the prison should ultimately be fully utilized for manufacturing purposes.

Let us now turn to a consideration more in detail of the separate prisons, and to a brighter side—that which concerns the men who are doing the best they can with a bad system. San Quentin, the oldest of the two, has been for six years under the wardenship of an able and attractive man, William E. Hale, formerly Sheriff of Alameda County. Those who have read the wonderfully interesting reports of the National Prison Convention are familiar with his methods and views. The report for 1895 (Denver meeting) shows that Warden Hale, in the breadth and sanity of his views, easily takes rank among the best wardens of the country. He thoroughly understands California and the Californians, and while progressive has never attempted the impossible. In his various reports and addresses he especially urges more industrial schools, better care of children, and more kindergartens, such as those established in San Francisco by the late Sarah B. Cooper. And, indeed, who can read Kate Douglas Wiggin's story of Patsy without recognizing

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the value of kindergartens in the prevention of crime? The San Francisco police once traced the careers of nine thousand kindergarten pupils, and found that not one had ever become a law-breaker.

Last summer San Quentin was the scene of an "epidemic of noise" on the part of many of its inmates. Some of the newspaper accounts of the affair were painfully exaggerated, and the prison management in consequence was severely criticised. The fact is that the outbreak was quelled rapidly and effectually, without outside help, with only a few days' interruption of work on the jute mill, and without injury to any person. A hose was simply turned into the noisy cells until their inmates were subdued.

There have been very few escapes in the history of the prison, and none in recent years. Its situation, on the extreme eastern end of a rocky peninsula of Marin County, projecting into the bay of San Francisco, is extremely well chosen for safety and isolation. The State owns a large tract here, but it is very poor soil, and much of its surface clay has been stripped for brick-making, so that no income from it is possible unless more bricks can be made and sold. The prison accommodations are extremely cramped, and large quantities of brick should be used in needed extensions. Many small industries could be carried on here, if permitted, for water carriage to and from San Francisco is very cheap. Heavy manufactures requiring expensive steam power are not justified here.

The abandonment of the large State improvements at San Quentin seems contrary to the dictates of economy. Equally unwise is the suggestion that it be made a prison to which only the most dangerous classes of criminals should be sent. On the other hand, Folsom, with its quarries and water power, seems fitted for a receiving prison, where all convicts, without exception, should be placed on indeterminate sentences at hard labor, and from which, on good behavior, on the credit system, they might be removed by the prison directors to San Quentin, there to work at more varied but no less self-supporting trades. The ponderous jute-mill machinery should all be transferred to Folsom, where power is now running to waste. At San Quentin, first, the State should adopt more advanced reformatory methods.

Official statistics of the two prisons contain many interesting features. In mere numbers the increase during the past two decades has not kept pace with the increase in the State's population. San Quentin at present usually contains about fourteen hundred and Folsom about nine hundred, but an increase equal to the gain in population would give them three thousand instead of twenty-three hundred. Even during the so-called hard times of recent years there has been no marked additions to the criminal classes in California, and the two great strikes—that of the ironworkers and that of the railroad brakemen and firemen—led to surprisingly few violations of the laws.

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Close observers say that there has been a marked increase during the past decade in the number of tramps, and that petty criminals have increased everywhere. But there are no statistics of the county and township jails. It seems certain that many villages and small towns, even where incorporated, have increasing trouble with gangs of hoodlums who are rapidly fitting themselves for State prisons. The reform schools have been largely recruited from this semi-criminal element, but stronger laws, swifter punishment, more firmness in dealing with young offenders, and, in brief, a higher grade of public sentiment on the part of citizens of small towns is evidently necessary. According to recent discussions in the New York Evening Post, the same sort of thing occurs in staid New England, and there, as here, it is one of the most serious problems of the times. From such a class of idle and vicious boys the prisons will hereafter be recruited, rather than from newcomers.

The nativity tables of both prisons show that the number of California-born convicts ranges in recent years from eighteen per cent in 1890 to nearly twenty-five per cent in 1895-'96. In that year in San Quentin, out of 819 American-born convicts, 314 were born in California, 68 in New York, 44 in Pennsylvania, 41 in Illinois, 36 in Ohio, and 35 each in Massachusetts and Missouri. Oregon sends 12, Arizona 10; Washington and Nevada are represented by only one apiece. The Southern States, excepting Kentucky and Virginia, send very few. Something the same proportion throughout holds at Folsom, and fairly indicates the States from which the population of California is chiefly drawn. The total of American nativity at San Quentin is sixty-four per cent; at Folsom, as last reported, it was about sixty-five per cent. Of the foreign born (thirty-six per cent at San Quentin), 99 out of 481 were Irish, 82 were Chinese, 56 were German, 49 were Mexican, and 44 were English. No one doubts that the laws are strictly enforced against the Chinese and the Mexicans (meaning Spanish-Californians); the other classes have votes and influence, and often have better chances for avoiding punishment for misdeeds. Japan contributes only one convict to San Quentin and two to Folsom. The Chinese as a rule go to prison for assaults upon each other ("highbinding"), for gambling, or similar offenses, but seldom for crimes against Americans. The Mexicans generally come to grief from an old-time *penchant* for other people's horses, or from drunken "cutting scrapes."

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A racial classification attempted at Folsom showed that out of 905 convicts 704 were Caucasian, 89 Indian and Mexican, 62 Mongolian, and 50 negroid. I do not find this elsewhere, so it may stand alone as merely one year's observations.

Of much more importance are the statistics of illiteracy, kept for a term of years. Warden Hale reports in 1896 that out of 1,287 prisoners, 120 can neither read nor write, 220 can read but can not write, and 947 can both read and write. Of course, many who are rated in the third class read and write very poorly, and a careful classification in terms of the public-school system is essential

to clearness. Warden Aull, at Folsom, reports that out of 905 convicts, 6 are college men, 81 are from private schools, 53 from both public and private schools, 582 have attended public schools only, and 147 are illiterate, while the remaining 36 call themselves "self-educated."

According to the evidence of the wardens, no full graduate of any American university has ever been an inmate of either prison. The so-called college men were men who had spent some time at a college of one kind or another. So-called professors appear among the convicts, but I have been unable to discover that any professor in an institution of standing has been at either San Quentin or Folsom since its establishment.

The preceding statistics of illiteracy are defective, but some additional light can be had from the tables upon occupations. Among 905 prisoners at Folsom, 96 occupations were represented. In round numbers, thirty-four per cent were mechanics, twenty-nine per cent were rated as laborers, twenty per cent were in business, and seven per cent were agriculturists. But a closer analysis of the statistics on this point shows that nearly fifty-seven per cent of the entire number came from the following occupations: acrobat, barber, bar-tender, butler, cook, gardener, hackman, hostler, laborer, laundryman, mill-hand, miner, nurse, sailor, vaquero, and "no occupation" (22).

The classification of crimes is very complete in all prison statistics, and usually follows the legal phraseology. Nearly all come under three great divisions—crimes against property, crimes of anger, and crimes which arise from a perverted sexuality. From year to year the proportion in these great divisions varies but little. In 1894 out of 1,287 convicts, 796 were sentenced for crimes against property, 358 of which were for burglary, 170 for grand larceny, and 39 for forgery; there were 343 commitments for assaults and murder, 188 of which were for murder in either the first or the second degree; lastly, there were 85 commitments for rape and other sex crimes. This was a typical year, and will serve to illustrate for all and at both prisons.

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The terms of imprisonment are long: out of 1,300 men in one annual report, 143 were for life, and 392 for ten years or more. Over 300 prisoners had served more than one term, and some were even serving their eighth term. Some at Folsom have reached their twelfth term. The ages of the prisoners have ranged from sixteen to eighty-six, but the danger period is evidently between eighteen and forty.

All of the prison officers agree respecting the bad physical condition of the convicts. Many of them are weak and ill when they enter the prison; many are the victims of unnamable personal vices. The physicians at San Quentin in 1895 reported 27 cases of scrofula, 30 of syphilis, 22 of epilepsy, 29 of opium habit, 62 of rheumatism, 70 of typhus fever, and 124 of general debility. Medical statistics at Folsom show similar conditions, aggravated by the malarial climate of that locality. The death rate, formerly higher at Folsom than at San Quentin, is now considerably lower, owing to the much better accommodations for the prisoners, and the hard outdoor labor required. In 1896 it was but .79 of one per cent.

It is gratifying to observe that the cost of maintenance of the prisoners has been gradually reduced. Nearly thirty years ago legislative committees reported that the cost of running the State's prisons was four or five times as much in proportion to the inmates as that of any other State in the Union, and that the prisoners lived better than the average landowner. More economical methods were gradually adopted, and by 1891 the cost per diem of a convict was 40 cents. This has been still further reduced; at San Quentin to 30.45 cents, and at Folsom to 32.50 cents.

There will always be outside criticisms of the food supplied as "too good for convicts," but it is merely that of ordinary field laborers, with much less variety. Under California conditions it could not well be made cheaper. If the food statistics of the prisons were so compiled as to separate the butter, olives, raisins, canned fruit, etc., properly used on the tables of officers and wardens, from the articles purchased for the prisoners, much misapprehension would be prevented.

As long as the State pays the entire expense bill, however, there will be a natural restiveness on the part of the taxpayers; the prison management, no matter how careful it is, must suffer for the sins of the system. The present directors and wardens are intelligent and honest men, who could put the prisons on a self-supporting basis if they had the authority and the necessary means for the plant required. A comparatively small amount of manufactures would pay the daily maintenance of the prisoners, and thus render the management much less subject to public criticism.

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This article is already as long as seems desirable, and I must close without describing the California reform schools, which are comparatively new, but have attracted much attention. At some future time I may have an opportunity to take up that subject.

THE SCIENTIFIC EXPERT AND THE BERING SEA CONTROVERSY.

By GEORGE A. CLARK.

In the November number of the Popular Science Monthly for 1897, Dr. Thomas C. Mendenhall

reviews at some length the workings of the Bering Sea Commission of 1892. Dr. Mendenhall was himself a member of this commission, and his account of its inside history is interesting and instructive as throwing light upon the after-work of the Paris Tribunal of Arbitration for which it was to prepare the natural-history data.

Dr. Mendenhall naturally finds little to commend in the work of his colleagues, the British experts, but he does not stop there, and proceeds to generalize in an uncomplimentary way regarding scientific experts as a class. For example, he lays down the following just and admirable rule for scientific investigation: "It should be commenced with no preconceived notions of how it is to come out, and judgment should wait upon facts," and then continues to say: "Justice to the man of science obliges the admission that, take him in his laboratory or library, with no end in view except that of getting at the truth, and he generally lives fairly up to this high standard; but transform him by the magic of a handsome retainer, or any other incentive, into a scientific expert, and he is a horse of another color."

It is not the purpose of this article to argue the cause of the man of science, or to say whether or not this arraignment is just. It is the intention merely to bring into contrast with the notable example of failure which Dr. Mendenhall cites, an equally notable example of success on the part of the scientific expert. If I mistake not, this simple comparison will be all the vindication the man of science needs.

To understand the full force of Dr. Mendenhall's article, it must be remembered that it appeared on the very eve of the meeting of a second Bering Sea Commission called to consider the selfsame issues which occupied the attention of the commission of 1892. The article therefore stands as a prediction of failure for the new commission. Nor does Dr. Mendenhall leave his meaning obscure in this regard. He says, "It is difficult to see what good will come from further discussions, investigations, or declarations"; and his conclusion is, "It will be impossible to know absolutely which group of scientific experts (American or British) was right in regard to pelagic sealing," this last subject being the rock on which the commission of 1892 split.

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It is not necessary here to go into the details of this first commission. These are given in Dr. Mendenhall's article. Two things only are essential to bring this meeting into contrast with the one of 1897. These are the instructions under which it was organized and its final report. Both are brief. The first is comprehended in the following statement, quoted from the Treaty of Arbitration of 1892: "Each Government shall appoint two commissioners to investigate conjointly with the commissioners of the other Government all facts having relation to seal life in Bering Sea, and the necessary measures for its protection and preservation."

The commissioners duly visited the fur-seal islands in Bering Sea, made their investigations, and were called together at Washington to deliberate upon the results obtained, and to prepare a joint report for the guidance of the Tribunal of Arbitration then about to convene at Paris. With Dr. Mendenhall was associated, on behalf of the United States, Dr. C. Hart Merriam. Great Britain was represented by Sir George Baden-Powell and Dr. George M. Dawson. The commission began its labors on the 8th of February, and completed them on the 4th of March following. Its final report, shorn of verbiage, consists of the following colorless statement: "We find that since the Alaska purchase a marked diminution in the numbers of the seals on and habitually resorting to the Pribilof Islands has taken place; that it is cumulative in effect, and that it is the result of excessive killing by man." One half of the work set for the commission—namely, measures for protection—was left wholly untouched.

In view of this meager and unsatisfactory result, it is perhaps not to be wondered at that Dr. Mendenhall should grow skeptical of the value of expert scientific evidence. But had he sought a cause of the failure of 1892 he might easily have found one more rational than the alleged "handsome retainer," or other "incentive."

It is manifestly true that the man of science can legitimately appear as an "expert" only when his evidence is desired on some line along which he has done work. An invertebrate morphologist is not an expert in electricity; nor a physicist in the habits of pinnipeds. One only of the four gentlemen, called upon in 1892 without their own consent to act as experts, had even a passing knowledge of the life history of marine mammals. Dr. Mendenhall was a physicist, Dr. Dawson a geologist, and Sir Baden-Powell something of a sportsman. Dr. Merriam alone, a mammalogist of the first rank, was a scientific expert in any proper sense.

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Moreover, the investigations conducted by the two commissions were, from a scientific point of view, of the nature of a farce. Less than two weeks were spent upon the islands, and that at a date in the season least favorable of all for observations. This meant that the greater part of their information was got second-hand by the commissioners.

In marked contrast to the findings of the joint meeting is the individual report of the American commission, prepared largely by Dr. Merriam. This stands out as a notable contribution to the subject of which it treats. Though largely a compilation, so well was the work of sifting and weighing evidence done, that not a single statement of fact in it has proved fallacious, and the more exhaustive investigations of 1896 and 1897 corroborate its conclusions in every particular. This was the work of the true "scientific expert," and he can ask no better vindication. The joint commission contained "experts" of another sort, and its report was necessarily different.

The second Bering Sea Commission came into existence in much the same way as the first. An agreement was reached in 1896 between the two nations whereby the entire fur-seal question

should become the subject of a new investigation. This agreement was the outgrowth of dissatisfaction on the part of the United States with the workings of the regulations of the Paris award.

The new investigation was begun at once and extended through the seasons of 1896 and 1897, and again the experts were called together at Washington to agree, if possible, on a joint statement of fact. The scope of the investigation and the object of the joint meeting are succinctly stated in the following words quoted in the preamble of the commission's report: "To arrive, if possible, at correct conclusions respecting the numbers, conditions, and habits of the seals frequenting the Pribilof Islands at the present time as compared with the several seasons previous and subsequent to the Paris award."

In the commission of 1897 the United States were represented by Dr. David S. Jordan and Hon. Charles S. Hamlin; Great Britain, by Prof. D'Arcy W. Thompson and Mr. James M. Macoun. It convened on the 10th of November and concluded its labors on the 17th, reaching a full and satisfactory agreement.

It will best serve our purpose to give the final report of the commission of 1897 in full. Two reasons make this appropriate: First, the substance of the sixteen concisely worded propositions of which it is made up can scarcely be stated in fewer words than the original. In fact, instead of condensing them, it will be necessary to amplify and explain many of the points made in order to be sure that they are clear to the lay reader. Second, the report has for some reason received practically no notice in the American press, and it is to be feared that the importance of the document has not been fully appreciated by the American public.

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1. There is adequate evidence that since the year 1884, and down to the date of the inspection of the rookeries in 1897, the fur-seal herd of the Pribilof Islands, as measured on either the hauling grounds or breeding grounds, has declined in numbers at a rate varying from year to year.

This proposition is in effect a restatement of the first clause of the agreement of 1892, but it is much more definitely put. The decline is not made to date vaguely "since the Alaska purchase" (1867), but "since the year 1884." This latter date is significant for a number of things. Prior to it for a period of thirteen years there had been no difficulty in securing the normal quota of 100,000 skins annually. In other words, up to that time the herd had remained in a state of equilibrium, yielding a maximum product. Again, this date marks the advent of pelagic sealing in Bering Sea, and the beginning of that remarkable expansion of the industry which culminated ten years later in 1894. The decline of the herd is thus made synonymous with the rise of pelagic sealing.

The real significance of this proposition, however, lies in the fact that the decline is declared to have been continuous to the present time. In other words, it did not stop or even slacken with the season of 1894. In this season, it will be remembered, the regulations of the Paris award, avowedly for the "protection and preservation of the fur-seal herd," went into effect. Translated into direct statement, this proposition is an admission that the regulations have failed of their object.

2. In the absence for the earlier years of actual counts of the rookeries such as have been made in recent years, the best approximate measure of decline available is found in these facts:

- a. About 100,000 male seals of recognized killable age were obtained from the hauling grounds each year from 1871 to 1889. The table of statistics given in Appendix I^[39] shows, on the whole, a progressive increase in the number of hauling grounds driven and in the number of drives made, as well as a retardation of the date at which the quota was attained during a number of years prior to 1889.

- b. In the year 1896, 28,964 killable seals were taken after continuing the driving till July 27th, and in 1897 19,189 after continuing the driving till August 11th. We have no reason to believe that during the period 1896 and 1897 a very much larger number of males of recognized killable age could have been taken on the hauling grounds.

The reduction between the years 1896 and 1897 in the number of killable seals taken, while an indication of decrease in the breeding herd, can not be taken as an actual measure of such decrease. A number of other factors must be taken into consideration, and the real measure of decrease must be sought in more pertinent statistics, drawn from the breeding rookeries themselves.

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We have already noted that in that portion of the period, 1871 to 1889, which falls prior to 1884, thirteen years in all, no difficulty was experienced in securing the full quota, and it may be added that this was completed not later than July 20th. A retardation of the date at which the quota can be filled is a direct indication of the degree of exhaustion of the hauling grounds. In marked contrast with these earlier years stand the conditions of 1896 and 1897, when greatly reduced quotas only were obtained, notwithstanding the unusual prolongation of the driving period.

The statement here made that the difference between the quotas of 1896 and 1897 is not an actual measure of decline in the breeding herd requires explanation. The quota of any year is dependent upon the birth rate of three years previous, killable seals being males of

approximately three years of age. The difference noted, therefore, while not indicative of the actual decrease for the seasons 1896 and 1897, is a direct measure of such decrease for the seasons of 1893 and 1894, when the seals in question were born.

That the rate of decline as thus shown was greater in 1893-'94 than in 1896-'97 is explained by the fact that, whereas only 30,000 seals were taken at sea in 1893, 60,000 were taken in 1894; while in 1896 43,000 were taken as against only 25,000 in 1897. In other words, the pelagic catch of 1894 exceeded that of 1893 by one hundred per cent, while that of 1897 fell seventy-two per cent below that of 1896. It is not, therefore, strange that the quota of 1897 should show a reduction of thirty per cent as against one of twelve per cent in the breeding herd for the same year.

3. From these data it is plain that the former yield of the hauling grounds of the Pribilof Islands was from three to five times as great as in the years 1896 and 1897, and the same diminution to one third or one fifth of the former product may be assumed when we include also the results of the hunting at sea.

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This proposition needs little comment. It is a simple deduction from the conditions of the preceding paragraph. The minimum estimate of former conditions is the lowest possible figure that could be in any way defended. The larger figure is apparently more nearly correct. The quota of 1898, of which we now have the record also, was about 18,000. It is not so stated in this paragraph, but the inference is inevitable that what is thus given as the decline of the "yield of the hauling grounds" is equally the decline of the breeding herd. A breeding herd which yielded without difficulty annually 100,000 killable animals (superfluous males of three years of age) must be reduced to something like one fifth its former size when it is able only with extreme difficulty to yield a quota of 20,000 such animals.

4. The death rate among young fur seals, especially among the pups, is very great. While the loss among the pups prior to their departure from the islands has been found in the past two years to approach twenty per cent of the whole number born, and though the rate of subsequent mortality is unknown, we may gather from the number which return each year that from one half to two thirds have perished before the age of three years—that is to say, the killable age for the males and the breeding age for the females.

The maximum and minimum figures here represent a division of opinion. The larger figure of two thirds would even seem to be a conservative estimate. The birth rate of 1897, as we know from close estimate, was approximately 130,000; it must have been greater in 1894, approaching 200,000. From this larger birth rate only about 20,000 males survived (the quota of 1897). There was doubtless a like number of females, the sexes being equal at birth and subject to like causes of natural loss. This gives a total of 40,000 in all, out of a birth rate of 200,000, which survived to the age of three years. This is one fifth, and it is evident that the mortality exceeds rather than falls below the maximum of two thirds.

5. The chief natural causes of death among pups, so far as known at present, are as follows, the importance of each being variable and more or less uncertain:

a. Ravages of the parasitic worm *Uncinaria*; most destructive on sandy breeding areas and during the period from July 15th to August 20th.

b. Trampling by fighting bulls or by moving bulls and cows, a source of loss greatest among young pups.

c. Starvation of pups strayed or separated from their mothers when very young, or whose mothers have died from natural causes.

d. Ravages of the great killer (*Orca*), known to be fatal to many of the young, and perhaps also to older seals.

At a later period drowning in the storms of winter is believed, but not certainly known, to be a cause of death among the older pups.

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The causes of death here enumerated are natural and inherent in the conditions under which the herd exists. That some of them were not known or fully understood until the investigations of 1896 and 1897 does not make them new or recent in their action. They have been constant factors, acting with greater intensity in the past when the herd was larger and more crowded upon its breeding grounds. Photographs taken in 1891 and 1892 show that the parasitic worm was then doing its deadly work, and more extensively in proportion as the herd was larger. For 1,495 pups dead from this cause counted by us on Tolstoi sand flat in 1896, 4,000 were counted on the same ground by the British commissioner of 1892. Moreover, the bones of innumerable pups on ground already abandoned in that year by the declining herd attest the existence of this cause of death prior to that time. We have no reason to suppose that it has not always preyed upon the herd. Death by trampling must at present be at a minimum on account of the scattered condition of the rookeries. The storms of winter and pelagic enemies must, of course, take toll in proportion to the number of animals.

But the significant fact shown by this proposition is that the gain of the herd must be small at best under such a natural death rate. We may suppose these natural losses to have been the

checks which in a state of nature prevented the indefinite increase of the herd. When, therefore, to this total loss of from two thirds to four fifths of the entire birth rate before breeding age is attained, we add the tremendous artificial loss through the destruction of gravid and nursing females resulting from pelagic sealing, it is not to be wondered at that the equilibrium was broken and the herd sent on a rapid decline.

6. Counts of certain rookeries, with partial counts and estimates of others, show that the number of breeding females bearing pups on St. Paul and St. George Island was, in 1896 and 1897, between 160,000 and 130,000, more nearly approaching the higher figure in 1896 and the lower in 1897.

These figures are based upon counts of all the breeding families on both islands for each season. On certain rookeries the live and dead pups were counted. In this way an average size of family was obtained which was used to complete the census where pups could not be counted.

7. On certain rookeries where pups were counted in both seasons, 16,241 being found in 1896 and 14,318 in 1897, or, applying a count adopted by Professor Thompson, 14,743 in the latter year, there is evident a decrease of nine to twelve per cent within the twelvemonth in question. The count of pups is the most trustworthy measure of numerical variation in the herd. The counts of harems, and especially of cows present, are much inferior in value. The latter counts, however, point in the same direction. The harems on all the rookeries were counted in both seasons. In 1896 there were 4,932; in 1897 there were 4,418, a decrease of 10.41 per cent. The cows actually present on certain rookeries at the height of the season were counted in both seasons. Where 10,198 were found in 1896, 7,307 were found in 1897, a decrease of 28.34 per cent.

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The important element in these special counts, undertaken with a view to determining the relative condition of the breeding herd for the two seasons, is the count of pups. All other classes of rookery population fluctuate from day to day, but the pups remain constantly on shore and near to the place of birth for the first six weeks of their lives, and it is merely a matter of patience and skill in counting them. Such a count on any rookery is an absolute record of the number of breeding females which has visited it for the season in question.

The minimum figure of nine per cent adopted by Professor Thompson is based upon a recount of a single rookery made by himself under conditions less favorable for accuracy than in the case of the official counts, which give the larger figure of twelve per cent, and which were made jointly by representatives of both commissions.

8. It is not easy to apply the various counts in the form of a general average to all the rookeries of the islands. We recognize that a notable decrease has been suffered by the herd during the twelvemonth 1896 to 1897, without attempting, save by setting the above numbers on record, to ascribe to the decrease more precise figures.

This is a rather extreme statement of the uncertainty which may be assumed to attach to these figures. The problem is not an easy one at best and its factors are complex. This should always be borne in mind, but not to the extent of doubting the value of the figures. The areas counted were large enough to be fairly typical. The counts were carefully done, and are accurate enough for all practical purposes. The probable error for the 15,000 more or less pups counted would not exceed 500. But as the counting was done in exactly the same manner and by the same persons for the two seasons, such errors as may exist are common to both counts and the relative conditions are unaltered. The figure of twelve per cent, moreover, must be taken as in itself a minimum, since it is the result of a number of individual counts varying in accuracy; and all in a sense underestimates, inasmuch as more animals are always overlooked among the rocks than are counted twice.

But the exact percentage of decrease is immaterial. That it has been a "notable" decrease is sufficient, and this is unquestioned. It may be noted in passing that this unequivocal decrease occurs in two seasons during which there was perfect enforcement of the regulations of the Paris award.

9. The methods of driving and killing practiced on the islands, as they have come under our observation during the past two seasons, call for no criticism or objection. An adequate supply of bulls is present on the rookeries; the number of older bachelors rejected in the drives during the period in question is such as to safeguard in the immediate future a similarly adequate supply; the breeding bulls, females, and pups on the breeding grounds are not disturbed; there is no evidence or sign of impairment of virility of males; the operations of driving and killing are conducted skillfully and without inhumanity.

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It was agreed by the commission of 1892 that "excessive killing by man" was the cause of the decline of the herd. As to the "man" in question the two sets of commissioners differed diametrically. The Americans placed the responsibility with the pelagic sealer; the British, with the lessees through their methods of sealing on land.

To any one who is at all familiar with the conspicuous part which the theories of close killing, and especially overdriving, played in the British contention before the Paris Tribunal of Arbitration, this full and frank vindication comes as a refreshing surprise. That it should be agreed to by

British scientific experts ought to revive even Dr. Mendenhall's faith. It is true that the statement is carefully limited to the seasons under observation, but neither the principle nor the methods of land killing have been altered within the past half century except in so far as they have been improved. It was an absurd and foolish theory which ascribed to the treatment of the non-breeding and superfluous male life of a herd of polygamous animals responsibility for the decline of its breeding stock, but it served a purpose useful to Canadian interests before the Paris tribunal. It is now forever eliminated from the fur-seal question.

10. The pelagic industry is conducted in an orderly manner, and in a spirit of acquiescence in the limitations imposed by law.

This statement is true, though wholly irrelevant to the question of the efficiency of the regulations themselves. Moreover, it stands as an implied impeachment of the active and efficient patrol fleet constantly maintained by the United States and Great Britain for the enforcement of the regulations governing the pelagic industry. For example, there were in 1896 five American and three British vessels engaged in active patrol of the waters of Bering Sea. One would think it a foregone conclusion that the pelagic industry should be law-abiding, whether of its own volition or not. In addition to all this, however, the regulations are as admirably suited to the needs of the pelagic sealer as if he had himself prepared them. There is, therefore, no reasonable incentive to violate them. Viewed in this light, this statement seems ludicrous, but it has a justification not evident at first sight.

The British experts demanded this statement as a balm for the wounded feelings of the pelagic sealer, and, such being the fact, the American commissioners assumed that it could do no harm to place it on record that he has conformed to the requirements of the law. But from the American point of view this paragraph has a wider and deeper meaning. We have seen in the opening paragraph that the decline in the herd has been continuous and uninterrupted during the period of the Paris regulations. It is admitted in paragraph 8 that the decrease for this same period has been a "notable" one. The rate is specified in paragraph 7 as from "nine to twelve per cent" during two years when the regulations were rigidly enforced. It only requires the climax of paragraph 10, asserting the perfect observance of the regulations, to complete their condemnation.

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11. Pelagic sealing involves the killing of males and females alike, without discrimination and in proportion as the two sexes coexist in the sea. The reduction of the males effected on the islands causes an enhanced proportion of females to be found in the pelagic catch; hence this proportion, if it vary from no other cause, varies at least with the catch on the islands. In 1895 Mr. A. B. Alexander, on behalf of the Government of the United States, found 62.3 per cent of females in the catch of the *Dora Seward* in Bering Sea; and in 1896 Mr. Andrew Halkett, on behalf of the Canadian Government, found 84.2 per cent in the catch of the same schooner in the same sea. There are no doubt instances, especially in the season of migration and in the course of the migrating herds, of catches containing a different proportion of the two sexes.

There are two ways and two alone whereby killing by man affects the fur-seal herd—namely, killing on land and killing at sea. Land killing has been vindicated in paragraph 9. We have here the necessary condemnation of pelagic killing expressed in equally full and frank terms. Land killing takes only males and leaves an adequate supply of bulls for breeding purposes; pelagic killing takes males and females alike, the latter sex constituting 62 to 84 out of every 100 killed.

It is not a vital matter that the female sex should be found to predominate in the pelagic catch, except in so far as it proves the falsity of the returns made so persistently by the Canadian sealing captain that the sexes are taken in virtually equal proportion at sea. The essential thing is that females are killed at all. That three fourths of all the animals taken at sea (during one season 140,000 animals were so taken) are of this sex only emphasizes the destructive nature of this industry.

12. The large proportion of females in the pelagic catch includes not only adult females that are both nursing and pregnant, but also young seals that are not pregnant and others that have not yet brought forth young, with such also as have recently lost their young through the various causes of natural mortality.

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This statement is put in the mildest possible form out of consideration for the old-time British contentions that the breeding females did not leave the islands while their young were dependent upon them, and that those taken at sea were "barren." The investigations of 1896 and 1897 proved conclusively that every female of two years old and over taken at sea was pregnant, and that those over two years of age when taken in Bering Sea were in addition nursing, having dependent pups on the islands. The manner of statement seems to imply an equality in importance between "young" seals and "adults." As females are never killed on land, they are naturally of all ages when found at sea, and the young animals (yearlings and two-year-olds) are necessarily vastly in the minority.

13. The polygamous habit of the animal, coupled with an equal birth rate of the two sexes, permits a large number of males to be removed with impunity from the herd, while, as with other animals, any similar abstraction of females checks or lessens the herd's increase, or, when carried further, brings about an actual diminution of the herd.

It is equally plain that a certain number of females may be killed without involving the actual diminution of the herd, if the number killed does not exceed the annual increment of the breeding herd, taking into consideration the annual losses by death through old age and through incidents of the sea.

This paragraph is really supplementary to 9 and 11. Neither the methods nor yet the principle of land killing are at fault. The animal being polygamous, a part of its male life can be removed with impunity. On the other hand, the killing of females leads to disastrous results.

The concluding sentence is a concession to diplomacy. It is true that a certain number of females may be killed without producing actual diminution. If pelagic sealing were stopped to-day the herd would naturally begin to increase. The measure of its increase would be the difference between the natural loss of adult breeders through old age and incidents of the sea, on the one hand, and the yearly accession of young breeders to bear their first pups, on the other. We can closely estimate the latter factor. It was equal, for example, to the quota of 20,000 in 1897, or sixteen and two thirds per cent of the birth rate. The quota was composed of males of approximately three years, and we may assume that a like number of three-year-old females entered the rookeries for the first time in the same season. We have then a gross gain to the breeding herd of sixteen and two thirds per cent.

We have no means of exact estimate for the loss of adult females because we do not know the period of life in the female. If, however, we estimate it at thirteen years, which seems to be a conservative figure, the animal would have ten years of breeding life. Then, from old age alone, ten per cent of the adult breeding females must die annually. This leaves a net gain of six and two thirds per cent with accidental factors unaccounted for. The killing of females which does not produce actual diminution must come well within this margin of six and two thirds per cent. It only remains to be stated that the pelagic catch of 1897, which was the smallest on record since 1884, exceeded fourteen per cent.

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14. While, whether from a consideration of the birth rate or from an inspection of the visible effects, it is manifest that the take of females in recent years has been so far in excess of the natural increment as to lead to the reduction of the herd in the degree related above, yet the ratio of the pelagic catch of one year to that of the following has fallen off more rapidly than the ratio of the breeding herd of one year to the breeding herd of the next.

This paragraph corrects possible erroneous implications which might be drawn from the truism in the preceding paragraph. A certain number of females may be taken, etc., but so many in excess of the safety limit have been taken that the herd has been reduced "in the degree related above"—that is, for 1896-'97, nine to twelve per cent, and for 1884-'97, fifty to eighty per cent.

Dr. Mendenhall said: "It will be impossible to know absolutely which group of scientific experts was right (in 1892) in regard to pelagic sealing." The admission made in this paragraph, taken together with other admissions made in paragraphs 11 and 12, effectually disproves this prediction. It ought to be a source of gratification to Dr. Mendenhall and to his colleague, Dr. Merriam, to find it thus clearly proved that they were right and their British associates wrong.

The final clause is here again a diplomatic concession to take the sting out of the real admission. The rapid fall in the pelagic catch as compared with the more even decline of the breeding herd is a natural phenomenon. Pelagic sealing not only destroys the herd, but it is necessarily self-destructive because it preys upon its own capital. The more successful it is the sooner it must cease. With the decline of the herd it is itself declining, and the rapidity of its fall proves the nearness of the end. For the years since 1894 the pelagic catch has been 61,000, 56,000, 43,000, and 25,000 respectively. It is a significant fact that in four years, under regulations which permit the pelagic sealer to take all he can get, the product of his industry has fallen to less than one half.

15. In this greater reduction of the pelagic catch, compared with the gradual decrease of the herd, there is a tendency toward equilibrium, or a stage at which the numbers of the breeding herd would neither increase nor decrease. In considering the probable size of the herd in the immediate future, there remains to be estimated the additional factor of decline resulting from reductions in the number of surviving pups, caused by the larger pelagic catch of 1894 and 1895.

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The two statements in this paragraph are not related. The first is a part of the preceding paragraph and is self-evident. Should the pelagic catch continue to decrease, as it must, it will eventually come within the margin of six and two thirds per cent. It has yet to fall far before this end is reached. Then will come that much-mooted "equilibrium," when the herd will be too insignificant to be worthy of attack—the equilibrium of ruin. There is no comfort in this prospect, either for the pelagic sealer or for the owner of the herd, and it takes no note of the injury which has been accomplished in the past, much less of possible restoration in the future. The equilibrium here suggested is purely a figure of speech, another concession to diplomacy.

The final statement of this paragraph is more important. The starvation of pups as a result of the killing of mothers at sea has been a fact strenuously denied from the first by the British side of the fur-seal controversy. After the actual counting of 16,000 of these starved pups in 1896, this position could no longer be maintained. At the same time a specific admission of the fact of

starvation and of the destruction of unborn pups was too difficult a matter for the British experts to face. These facts are left to be inferred from the "reductions in surviving pups" here noted and from the admission that "nursing and pregnant females" are taken in the pelagic catch. Stated directly, it is here admitted that on account of "the larger pelagic catch of 1894 and 1895," numbers of pups starved to death on the rookeries or died unborn with their mothers which in the course of Nature should have reached the killable and breeding age.

16. The diminution of the herd is yet far from a stage which involves or threatens the actual extermination of the species, so long as it is protected in its haunts on land. It is not possible during the continuation of the conservative methods at present in force upon the islands, with the further safeguard of the protected zone at sea, that any pelagic killing should accomplish this final end. There is evidence, however, that in its present condition the herd yields an inconsiderable return either to the lessees of the islands or to the owners of the pelagic fleet.

The statements of this concluding paragraph must be taken in close connection, and the "ifs" must be carefully noted if they are not to prove very misleading. The opening sentence refers to the biologic extinction of the herd as contrasted with its commercial ruin. The former is as yet far off, the latter is a matter of history, as is admitted in the concluding statement—"an inconsiderable return." This means simply that the herd has ceased to be a commercial factor, and henceforth under present conditions sealing, whether on land or at sea, must be conducted at a loss.

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This has an important bearing upon the suggested impossibility of bringing about the extinction of the species. It all depends upon whether present conditions are maintained. The breeding islands and the sixty-mile protected zone must be guarded. It cost the United States \$175,000 for patrol in 1896. England's expense was less, but still considerable. It is beyond reason that this expensive protection should be continued at a loss or without hope of ultimate restoration of the herd. Remove the protection for a single season and the herd would be practically exterminated. A scattered remnant would doubtless escape to maintain a melancholy equilibrium, or perhaps to recuperate and again attract the cupidity of some adventurous sealing captain, but the herd as such would be at an end.

Stated without reference to diplomatic necessities, this concluding paragraph admits two important things: first, that the herd of fur seals resorting to the Pribilof Islands is commercially ruined; second, that its extinction as a species only awaits the abandonment of certain arduous and costly measures of protection now maintained solely in the hope of more adequate protection and the ultimate restoration of the herd.

Such was the work of the Conference of Fur-Seal Experts of 1897. The handwriting of diplomacy is mingled with that of science in its findings, but the resulting obscurity affects only minor matters. The important issues of the vexatious Bering Sea controversy are squarely met and finally settled. It is needless to say that there no longer exists a fur-seal question. It is merely a question of how to get rid of the destructive agency of pelagic sealing. This is a matter for diplomacy to adjust. Any odium which may have attached to the "man of science" as a result of the failure of the meeting of 1892 is effectually wiped out, and if the lesson is read aright by the nations, henceforth the scientific expert must be counted an essential factor in the settlement of governmental disputes.

In a paper on the industrial applications of electro-chemistry, Mr. Thomas Ewan points out as among those that may yet be developed, that it is possible, by compressing sulphur dioxide and air into separate carbon tubes dipping in sulphuric acid, to cause the two gases to combine to form sulphuric acid, and at the same time furnish an electric current. "The alluring prospect," he says, "of obtaining electric energy as a by-product in a chemical works should be a sufficient incentive to efforts to overcome the numerous difficulties in the way."

A SCHOOL FOR THE STUDY OF LIFE UNDER THE SEA.

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(*Naples Aquarium.*)

BY ELEANOR HODGEN PATTERSON.

To go deep down under the sea, in the warm waters of the south, where exist not only the varieties of fish with which we are familiar, but thousands of jewel-like forms of animal life never seen by us, has hitherto been impossible to any but the boldest fishermen and divers. But of late years in the small aquarium at Naples the sea has been brought up, so to speak, upon the earth for us to see these strange creatures as they exist in their homes under the water, as they eat their food, as they love and hate, and prey upon each other.

Small as the collection at first seems to be, there is no zoölogical station in the world to compare

with it. Probably there never will be again. Because of its advantageous station on the shores of the Mediterranean, where it is claimed the waters which wash Italy and Sicily yield a greater variety of sea life than even tropical waters, and also its comparative accessibility to all countries, the scholars who come here from all over the world find that they are able to study here as they can nowhere else the strange habits of the tiny animals down at the bottom of the sea.

There is no superfluous room taken up in the Naples aquarium for the fish that may be studied in aquariums elsewhere. Only the rarest, the strangest, the most curious creatures are here to be seen.

But one room of the beautiful building devoted to the zoölogical station, which stands on that street of Naples running along the sea, is shown to the public. One walks into it from the level of the street, and the transition from the light outside to strange semi-darkness is as if one were to suddenly find himself walking upon the bottom of the sea.

The light comes only from above, shining through water of many hundreds of cubic feet, on to what seems at first a garden of moving flowers behind tanks of clear glass, which seem, so complete is the illusion, not like glass at all, but water. The visitor walks along dark alleys lined on both sides with these brilliant tanks, and the beautiful sea animals are so close that it seems easy to touch them. It is like being in a narrow, dark theater with the stage all around and about, strangely illuminated, not by footlights, but by a radiance from above.

There are about thirty tanks in all, and at the very first of these glass-walled vats we stopped entranced. Behind it were piles of rocks shining in the water, and from every crevice grew what seemed brilliant flowers, but of colors so soft and waxlike that they were almost more lovely than our flowers of earth.

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"Surely these deep red ones that cover the rocks to the left are a species of aster, and these are cacti, and these, yes, these reddish-brown one are chrysanthemums and nothing else."

But even as we spoke we saw the petals of first one, then another, flower wave back and forth, and in and out, with curious curling movements, as none of our flowers do, even in the most various winds, and then from above a long pole was suddenly thrust down into the water, at the end of which was stuck a piece of raw red meat about as large as a walnut.

It was the keeper come to feed his strange charges. Again and again were the bits of meat thrust down into the hearts of the sea flowers, and then we discovered with a kind of shock that these asters and cacti and chrysanthemums were not flowers at all, but flesh-eating animals, and that each waving petal was a mouth, by which the creature sucked in the blood of the meat.

When all the juice had been extracted from the meat, the many mouths attached to each seeming flower, that had been tightly curled upon the raw flesh, now unfolded again into their petal-like positions in a circle, one over the other, and the meat, now but a tiny ball of dry pulp, slowly sank to the bottom of the tank. What the calyx was like, or whether it had any body at all, we could not see, so entirely hidden was it behind these many waving, armlike mouths.

In the next tank several sea horses were swimming merrily in and out of rocks that were covered by a growth of miniature trees. They were smaller than the tiniest hobbyhorse that has ever been seen, as small almost as the toy horses in a "Noah's ark." The resemblance of these small fish, not larger than smelts or minnows, that have come to be known as "sea horses," to real horses is in the head only. The rest of the body tapers off into the ordinary fishlike form. I wondered, as I looked at these small horses of the sea, if it was from them that the old myth of the existence of mermaids arose. "Half fish, half women" were the mermaids, but "half fish, half horses" are these fish.

They were lively little creatures, and swam in and out of the tiny forest as if they were playing a game of "tag." What a beautiful little forest it was to play in! The trees had brown trunks about the size of one's finger, and from the top a graceful, palmlike foliage branched out, but the foliage was not in greens, but deep, translucent reds, or coral pinks, or warm browns.

While I was admiring one of the little coral pink trees, one of the sea horses swam straight into its foliage, when, to my amazement, and evidently to the amazement of the sea horse also, the foliage instantly disappeared down into the tree trunk, leaving only the brown stem standing.

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Aghast with surprise at the sudden revelation that this charming foliage, like the petals of the flowers in the last tank, was also a cluster of living suckers, I asked what name they were called by, and heard with disgust the answer "worms." These beautiful, curious creatures only the things we know by the loathsome word "worms!"

These sea worms, or annelids, as the scientific scholars call them, build up for themselves the brown tubes that resemble the rough stems of pines or palms, and from the top they send out their worm-like bodies in clusters, where they wave back and forth in the water, to sweep in any food that may be near, always holding themselves in readiness to withdraw into their holes at danger.

Whether the brilliant foliage of each tree was but the many tentacles of a single animal emerging from the tube, or whether it was a whole family of worms come up to the top of their home to gaze from the chimney, so to speak, we could not discover. But, strange to say, the grotesque little sea horse seemed to be trying to decide that question for himself, for, after swimming away a moment in fright at this sudden disappearance, he returned and appeared to be peeping down

into the tube.

The next tank revealed even greater surprise than we had yet seen. Here in the water long white gauze ribbons were waving, as if hung from above, and so transparent that we could see quite through them, almost as if they were composed of the white of an egg. It was only by looking closely that up near the top we could see a tiny black dot, like a pinhead, in each fleecy scarf. This was the head of the animal, or its eye, or mouth, or whatever such a delicate dot might be called.

These are of the jellyfish family, and have only lately been added to the aquarium. Owing to the difficulty of procuring such pulplike masses, they are extremely rare specimens, and can be seen nowhere else. Surely nothing more frail, more delicately lovely exists on land or sea, in plant or animal life, than these gauzy living sashes of the sea.

But not all the denizens of the tanks are beautiful to look upon. There is a tank near the door of entrance filled with objects so hideous that one starts away from them with horror. These are the octopi, or devilfish. Imagine the ugliest, biggest black spider that you ever saw, and enlarge it to the size of the largest turtle you ever saw, and on the end of each of the spider's legs fasten a wicked-looking mouth, and you can form some idea of how frightful an octopus can be.

Several of these monsters were writhing near the glass wall, stretching out their long, boneless arms, and sometimes fastening their suckers upon the glass in the search for food, thus unconsciously showing off the ugliness of their mouths. It was now time for the keeper to come to them in his round of feeding. He put into the tank from above a number of crabs, when suddenly the whole tank seemed filled with octopi. They had been sleeping among the dark rocks, of which they were so much the color that we had not before observed them. The poor little crabs had probably been stunned, or perhaps killed, by the keeper, for they made no resistance when the octopi fastened upon them their long suckers in a death-grasp. The octopi fought with each other over the possession of the crabs, and for some moments there was a terrible waving to and fro of black suckers fully two yards in length.

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Beside this tank was another of clear water in which were some peaceful cuttlefish. The keeper, for a few coins, stirred these out of their quiet by moving his long stick after them. They swam about in fright for a moment or two, and then we saw them no more, for the clear water had suddenly become a thick black fluid. The cuttlefish had discharged their bags of ink to escape the pursuing enemy.

The upper floors of the zoölogical station are seldom shown to visitors, but these are almost more interesting than the tank room below. Here the great scholars who make a life study of these strange inhabitants of the deep have their tables; here the dredgings of the sea are brought by fishermen and divers for them to assort; here sea animals are developed by them from the egg, and even from invisible germs.

Each investigator into the strange lower world is furnished with his own aquaria, suited to the special branch he may be studying, for nearly all are interested in a special branch of zoölogy. One man has come a long distance to pursue the study of sponges, and he is furnished with a perfect garden of them, for they are brought up from this part of the Mediterranean in infinite variety.

Another student is studying the habits of mollusks, and basins and jars of these and their eggs are near him. There are divers' costumes hanging on the walls in which the *savants* may themselves descend to the bottom of the sea and study the inhabitants in their native houses.

There are laboratories and libraries here, adapted to the most exhaustive study, and a fleet of small boats is also kept exclusively for the use of the zoölogical station.

Fishermen constantly bring in baskets filled with what seems to be only wet rubbish, heaps of stones, and worthless bits of pulp. This is examined and assorted by trained eyes, and placed in tanks of water where siphons are constantly pouring fresh sea water, after which the rubbish is quietly left until accustomed to its new quarters. Then cautiously this rubbish begins to move, the stones stir, and the pulp opens into the beautiful colors, the plants, the gauzy scarfs, and the numerous other strange things afterward shown to the public in the aquarium below.

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Along the walls of these upper rooms are jars wherein are preserved many curious denizens of the sea that have been killed by powerful chemicals, which have surprised the delicate animals before their sensitive tentacles have had time to close, thus preserving to science many rare creatures impossible to keep long in captivity.

The great cost of this establishment is maintained in several ways—by the issuing of publications and scientific papers in several languages, by the rents from the desks or tables used by the investigators, and by the unusually large price of admission demanded from the public at the aquarium entrance. In addition to this are the fees from the students who come from afar to study here. A payment of four hundred dollars each gives students the right to study in the Naples zoölogical station for ten months of the year.

When the history of education during the nineteenth century comes to be written, one of its most striking features will be presented by the rise and growth of science in the general educational arrangements of every civilized country. At the beginning of the century our schools and colleges were still following, with comparatively little change, the methods and subjects of tuition that had been in use from the time of the middle ages. But the extraordinary development of the physical and natural sciences, which has done so much to alter the ordinary conditions of life, has powerfully affected also our system of public instruction. The mediæval circle of studies has been widely recognized not to supply all the mental training needed in the ampler range of modern requirement. Science has, step by step, gained a footing in the strongholds of the older learning. Not without vehement struggle, however, has she been able to intrench herself there. Even now, although her ultimate victory is assured, the warfare is by no means at an end. The jealousy of the older *régime* and the strenuous, if sometimes blatant, belligerency of the reformers have not yet been pacified; and, from time to time, within our public schools and universities, there may still be heard the growls of opposition and the shouts of conflict. But these sounds are growing fainter. Even the most conservative don hardly ventures nowadays openly to denounce Science and all her works. Grudgingly, it may be, but yet perforce, he has to admit the teaching of modern science to a place among the subjects which the university embraces, and in which it grants degrees. In our public schools a "modern side" has been introduced, and even on the classical side an increasing share of the curriculum is devoted to oral and practical teaching in science. New colleges have been founded in the more important centers of population, for the purpose, more particularly, of enabling the community to obtain a thorough education in modern science.

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The mainspring of this remarkable educational revolution has, doubtless, been the earnest conviction that the older learning was no longer adequate in the changed and changing conditions of our time; that vast new fields of knowledge, opened up by the increased study of Nature, ought to be included in any scheme of instruction intended to fit men for the struggle of modern life, and that in this newer knowledge much might be found to minister to the highest ends of education. Nevertheless, it must be admitted that utilitarian considerations have not been wholly absent from the minds of the reformers. Science has many and far-reaching practical applications. It has called into existence many new trades and professions, and has greatly modified many of those of older date. In a thousand varied ways it has come into the ordinary affairs of everyday life. Its cultivation has brought innumerable material benefits; its neglect would obviously entail many serious industrial disadvantages, and could not fail to leave us behind in the commercial progress of the nations of the globe.

So much have these considerations pressed upon the attention of the public in recent years that, besides all the other educational machinery to which I have referred, technical schools have been established in many towns for the purpose of teaching the theory as well as the practice of various arts and industries, and making artisans understand the nature of the processes with which their trades are concerned.

That this educational transformation, which has been advancing during the century, has resulted in great benefit to the community at large can hardly be denied. Besides the obvious material gains, there has been a widening of the whole range and method of our teaching; the old subjects are better, because more scientifically taught, and the new subjects enlist the attention and sympathy of large classes of pupils whom the earlier studies only languidly interested. Nevertheless, it is incumbent on those who have advocated and carried out this change to ask themselves whether it has brought with it no drawbacks. They may be sure that no such extensive reform could possibly be accomplished without defects appearing somewhere. And it is well to look these defects in the face and, as far as may be possible, remove them. In considering how I might best discharge the duty with which I have been honored of addressing the students of Mason College this evening, I have thought that it might not be inappropriate if, as a representative of science, I were to venture to point out some of the drawbacks as well as the advantages of the position which science has attained in our educational system.

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At the outset no impartial onlooker can fail to notice that the natural reaction against the dominance of the older learning has tended to induce an undervaluing of the benefits which that learning afforded and can still bestow. In this college, indeed, and in other institutions more specially designed for instruction in science, provision has also been made for the teaching of Latin, Greek, and the more important modern languages and literatures. But in such institutions these subjects usually hold only a subordinate place. It can hardly be denied that generally throughout the country, even although the literary side of education still maintains its pre-eminence in our public schools and universities, it is losing ground, and that every year it occupies less of the attention of students of science. The range of studies which the science examinations demand is always widening, while the academic period within which these studies must be crowded undergoes no extension. Those students, therefore, who, whether from necessity or choice, have taken their college education in science, naturally experience no little difficulty in finding time for the absolutely essential subjects required for their degrees. Well may they declare that it is hopeless for them to attempt to engage in anything more, and especially in anything that will not tell directly on their places in the final class lists. With the best will in the world, and with even, sometimes, a bent for literary pursuits, they may believe themselves compelled to devote their whole time and energies to the multifarious exactions of their science curriculum.

Such a result of our latest reformation in education may be unavoidable, but it is surely matter for regret. A training in science and scientific methods, admirable as it is in so many ways, fails to supply those humanizing influences which the older learning can so well impart. For the moral stimulus that comes from an association with all that is noblest and best in the literatures of the past, for the culture and taste that spring from prolonged contact with the highest models of literary expression, for the widening of our sympathies and the vivifying of our imagination by the study of history, the teaching of science has no equivalents.

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Men who have completed their formal education with little or no help from the older learning may be pardoned should they be apt to despise such help and to believe that they can very well dispense with it in the race of life. My first earnest advice to the science students of this college is, not to entertain this belief and to refuse to act on it. Be assured that, in your future career, whatever it may be, you will find in literature a source of solace and refreshment, of strength and encouragement, such as no department of science can give you. There will come times, even to the most enthusiastic among you, when scientific work, in spite of its absorbing interest, grows to be a weariness. At such times as these you will appreciate the value of the literary culture you may have received at school or college. Cherish the literary tastes you have acquired, and devote yourselves sedulously to the further cultivation of them during such intervals of leisure as you may be able to secure.

Over and above the pleasure which communion with the best books will bring with it, two reasons of a more utilitarian kind may be given to science students why they should seek this communion. Men who have been too exclusively trained in science, or are too much absorbed in its pursuit, are not always the most agreeable members of society. They are apt to be somewhat angular and professional, contributing little that is interesting to general conversation, save when they get a chance of introducing their own science and its doings. Perhaps the greatest bore I ever met was a man of science, whose mind and training were so wholly mathematical and physical that he seemed unable to look at the simplest subject save in its physical relations, about which he would discourse till he had long exhausted the patience of the auditor whom he detained. There is no more efficacious remedy for this tendency to what is popularly known as "shop" than the breadth and culture of mind that spring from wide reading in ancient and modern literature.

The other reason for the advice I offer you is one of which you will hardly, perhaps, appreciate the full force in the present stage of your career. One result of the comparative neglect of the literary side of education by many men of science is conspicuously seen in their literary style. It is true that in our time we have had some eminent scientific workers, who have also been masters of nervous and eloquent English. But it is not less true that the literature of science is burdened with a vast mass of slipshod, ungrammatical, and clumsy writing, wherein sometimes even the meaning of the authors is left in doubt. Let me impress upon you the obvious duty of not increasing this unwieldy burden. Study the best masters of style, and when once you have made up your minds what you want to say, try to express it in the simplest, clearest, and most graceful language you can find.

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Remember that, while education is the drawing out and cultivation of all the powers of the mind, no system has yet been devised that will by itself develop with equal success every one of these powers. The system under which we have been trained may have done as much for us as it can do. Each of us is thereafter left to supplement its deficiencies by self-culture. And in the ordinary science instruction of the time one of the most obvious of these inevitable deficiencies is the undue limitation or neglect of the literary side of education.

But in the science instruction itself there are dangers regarding which we can not be too watchful. In this college and in all the other well-organized scientific institutions of the country the principles of science are taught orally and experimentally. Every branch of knowledge is expounded in its bearings on other branches. Its theory is held up as the first great aim of instruction, and its practical applications are made subsequent and subordinate. Divisions of science are taught here which may have few practical applications, but which are necessary for a comprehensive survey of the whole circle of scientific truth. Now, you may possibly have heard, and in the midst of a busy industrial community you are not unlikely to hear, remarks made in criticism of this system or method of tuition. The importance of scientific training will be frankly acknowledged and even insisted upon, but you will sometimes hear this admission coupled with the proviso that the science must be of a practical kind; must, in short, be just such and no other as will fit young men to turn it to practical use in the manufactures or industries to which they may be summoned. The critics who make this limitation boast that they are practical men, and that in their opinion theory is useless or worse for the main purposes for which they would encourage and support a great scientific school.

Now I am quite sure that those science students who have passed even a single session in Mason College can see for themselves the utter fallacy of such statements and the injury that would be done to the practical usefulness of this institution and to the general progress of the industrial applications of science if such short-sighted views were ever carried into effect. There can be no thorough, adequate, and effective training in science unless it be based on a comprehensive study of facts and principles, altogether apart from any economic uses to which they may be put. Science must be pursued for her own sake, in the first instance, and without reference to any pecuniary benefits she may be able to confer. We never can tell when the most theoretical part of pure science may be capable of being turned to the most important practical uses. Who could have surmised, for instance, that in the early tentative experiments of Volta, Galvani, and others

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last century lay the germ of the modern world-grasping electric telegraph? Or when Wedgwood, at the beginning of this century, copied paintings by the agency of light upon nitrate of silver, who could have foretold that he was laying the foundations of the marvelous art of photography?

There can be no more pernicious doctrine than that which would measure the commercial value of science by its immediate practical usefulness, and would restrict its place in education to those only of its subdivisions which may be of service to the industries of the present time. Such a curtailed method of instruction is not education in the true sense of the term. It is only a kind of cramming for a specific purpose, and the knowledge which it imparts, being one-sided and imperfect, is of little value beyond its own limited range. I by no means wish to undervalue the importance of technical instruction. By all means let our artisans know as much as can be taught them regarding the nature and laws of the scientific processes in which they are engaged. But it is not by mere technical instruction that we shall maintain and extend the industrial and commercial greatness of the country. If we are not only to hold our own, but to widen the boundaries of applied science, to perfect our manufactures, and to bring new departments of Nature into the service of man, it is by broad, thorough, untrammelled scientific research that our success must be achieved.

When, therefore, you are asked to explain of what practical use are some of the branches of science in which you have been trained, do not lose patience with your questioner, and answer him as you think such a Philistine deserves to be answered. Give him a few illustrations of the thousands of ways in which science, that might have been stigmatized by him as merely abstract and theoretical, has yet been made to minister to the practical needs of humanity. Above all, urge him to attend some of the classes of Mason College, where he will learn, in the most effectual manner, the intimate connection between theory and practice. If he chances to be wealthy, the experiment may possibly open his eyes to the more urgent needs of the institution, and induce him to contribute liberally toward their satisfaction.

Among the advantages and privileges of your life at college there is one, the full significance and value of which you will better appreciate in later years. You have here an opportunity of acquiring a wide general view of the whole range of scientific thought and method. If you proceed to a science degree you are required to lay a broad foundation of acquaintance with the physical and biological sciences. You are thus brought into contact with the subjects of each great department of natural knowledge, and you learn enough regarding them to enable you to understand their scope and to sympathize with the workers who are engaged upon them. But when your academical career is ended, no such chance of wide general training is ever likely to be yours again. You will be dragged into the whirl of life, where you will probably find little time or opportunity to travel much beyond the sphere of employment to which you may have been called. Make the most, therefore, of the advantages which in this respect you meet with here. Try to insure that your acquaintance with each branch of science embraced in your circle of studies shall be as full and accurate as lies in your power to make it. Even in departments outside the bounds of your own tastes and ultimate requirements, do not neglect the means provided for your gaining some knowledge of them. I urge this duty, not because its diligent discharge will obviously tell in your examinations, but because it will give you that scientific culture which, while enabling you to appreciate and enjoy the successive advances of other sciences than that which you may select for special cultivation, will at the same time increase your general usefulness and aid in your own researches.

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The days of Admirable Crichtons are long since past. So rapid and general is the onward march of science that not only can no man keep pace with it in every direction, but it has become almost hopelessly impossible to remain abreast of the progress in each of the several subdivisions of even a single science. We are entering more and more upon the age of specialists. It grows increasingly difficult for the specialists, even in kindred sciences, to remain in touch with each other. When you find yourselves fairly launched into the vortex of life you will look back with infinite satisfaction to the time when you were enabled to lay a broad and solid platform of general acquirement within the walls of this college.

Perhaps the most remarkable defect in the older or literary methods of education was the neglect of the faculty of observation. For the training of the other mental faculties ample provision was made, but for this, one of the most important of the whole, no care was taken. If a boy was naturally observant, he was left to cultivate the use of his eyes as he best might; if he was not observant, nothing was done to improve him in this respect, unless it were, here and there, by the influence of such an intelligent teacher as is described in Mrs. Barbauld's famous story of Eyes and No Eyes. Even when science began to be introduced into our schools, it was still taught in the old or literary fashion. Lectures and lessons were given by masters who got up their information from books, but had no practical knowledge of the subjects they taught. Class-books were written by men equally destitute of a personal acquaintance with any department of science. The lessons were learned by rote, and not infrequently afforded opportunities rather for frolic than for instruction. Happily, this state of things, though not quite extinct, is rapidly passing away. Practical instruction is everywhere coming into use, while the old-fashioned cut-and-dry lesson-book is giving way to the laboratory, the field excursion, and the school museum.

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It is mainly through the eyes that we gain our knowledge and appreciation of the world in which we live. But we are not all equally endowed with the gift of intelligent vision. On the contrary, in no respect, perhaps, do we differ more from each other than in our powers of observation. Obviously, a man who has a quick eye to note what passes around him must, in the ordinary affairs of life, stand at a considerable advantage over another man who moves unobservantly on

his course. We can not create an observing faculty any more than we can create a memory, but we may do much to develop both. This is a feature in education of much more practical and national importance than might be supposed. I suspect that it lies closer than might be imagined to the success of our commercial relations abroad. Our prevalent system of instruction has for generations past done nothing to cultivate the habit of observation, and has thus undoubtedly left us at a disadvantage in comparison with nations that have adopted methods of tuition wherein the observing faculty is regularly trained. With our world-wide commerce we have gone on supplying to foreign countries the same manufactured goods for which our fathers found markets in all quarters of the globe. Our traders, however, now find themselves in competition with traders from other nations who have been trained to better use of their powers of observation, and who, taking careful note of the gradually changing tastes and requirements of the races which they visit, have been quick to report these changes and to take means for meeting them. Thus, in our own centers of trade, we find ourselves in danger of being displaced by rivals with sharper eyes and greater powers of adaptation.

It is the special function of science to cultivate this faculty of observation. Here in Mason College, from the very beginning of your scientific studies you have been taught to use your eyes, to watch the phenomena that appear and disappear around you, to note the sequence and relation of these phenomena, and thus, as it were, to enter beneath the surface into the very soul of things. You can not, however, have failed to remark among your fellow-students great inequalities in their powers of observation, and great differences in the development of these powers under the very same system of instruction. And you may have noticed that, speaking generally, those classmates who have shown the best observing faculty have taken foremost places among their fellows. It is not a question of mere brain power. A man may possess a colossal intellect, while his faculty of observation may be of the feeblest kind. One of the greatest mathematicians of this century who, full of honors, recently passed away from us, had so little cognizance of his surroundings that many ludicrous stories are told of his childlike mistakes as to place and time.

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The continued development of the faculty of prompt and accurate observation is a task on which you can not bestow too much attention. Your education here must already have taught you its value. In your future career the use you make of this faculty may determine your success or your failure. But not only have your studies in this college trained your observing powers, they have at the same time greatly widened the range of your mental vision by the variety of objects which you have been compelled to look at and examine. The same methods which have been so full of benefit to you here can be continued by you in after life. And be assured that in maintaining them in active use you will take effective means for securing success in the careers you may choose to follow.

But above and beyond the prospect of any material success there is a higher motive which will doubtless impel you. The education of your observing faculty has been carried on during your introduction to new realms of knowledge. The whole domain of Nature has been spread out before you. You have been taught to observe thousands of objects and processes of which, common though they may be, you had previously taken no note. Henceforth, wherever you may go, you can not wander with ignorant or unobservant eyes. Land and sea and sky, bird and beast and flower now awaken in you a new interest, for you have learned lessons from them that have profoundly impressed you, and you have discovered meanings in them of which you had never dreamed. You have been permitted to pass within the veil of Nature, and to perceive some of the inner mechanism of this world.

Thus, your training in science has not only taught you to use your eyes, but to use them intelligently, and in such a way as to see much more in the world around you than is visible to the uninstructed man. This widened perception might be illustrated from any department of natural science. Let me take, by way of example, the relation of the student of science toward the features and charms of landscape. It may be said that no training is needed to comprehend these beauties; that the man in the street, the holiday maker from town, is just as competent as the man of science to appreciate them, and may get quite as much pleasure out of them. We need not stop to discuss the relative amounts of enjoyment which different orders of spectators may derive from scenery; but obviously the student of science has one great advantage in this matter. Not only can he enjoy to the full all the outward charms which appeal to the ordinary eye, but he sees in the features of the landscape new charms and interests which the ordinary untrained eye can not see. Your accomplished professor of geology has taught you the significance of the outer lineaments of the land. While under his guidance you have traced with delight the varied features of the lovely landscapes of the Midlands, your eyes have been trained to mark their connection with each other, and their respective places in the ordered symmetry of the whole scene. You perceive why there is here a height and there a hollow; you note what has given the ridges and vales their dominant forms and directions; you detect the causes that have spread out a meadow in one place and raised up a hill in another.

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Above and beyond all questions as to the connection and origin of its several parts, the landscape appeals vividly to your imagination. You know that it has not always worn the aspect which it presents to-day. You have observed in these ridges proofs that the sea once covered their site. You have seen the remains of long-extinct shells, fishes, and reptiles that have been disinterred from the mud and silt left behind by the vanished waters. You have found evidence that not once only, but again and again, after vast lapses of time and many successive revolutions, the land has sunk beneath the ocean and has once more emerged. You have been shown traces of

underground commotion, and you can point to places where, over central England, volcanoes were once active. You have learned that the various elements of the landscape have thus been gradually put together during successive ages, and that the slow processes, whereby the characteristic forms of the ground have been carved out, are still in progress under your eye.

While, therefore, you are keenly alive to the present beauty of the scene, it speaks to you, at every turn, of the past. Each feature recalls some incident in the strange primeval history that has been transacted here. The succession of contrasts between what is now and what has been fills you with wonder and delight. You feel as if a new sense had been given to you, and that with its aid your appreciation of scenery has been enlarged and deepened to a marvelous degree.

And so, too, is it with your relation to all the other departments of Nature. The movements of the clouds, the fall of rain, the flow of brook and river, the changes of the seasons, the succession of calm and storm, do not pass before your eyes now as they once did. While they minister to the joy of life, they speak to you of that all-embracing system of process and law that governs the world. The wayside flower is no longer to your eyes merely a thing of beauty. You have found it to be that and far more—an exquisite organism in which the several parts are admirably designed to promote the growth of the plant and to perpetuate the life of the species. Every insect and bird is now to you an embodiment of the mystery of life. The forces of Nature, once so dark and so dreaded, are now seen by you to be intelligible, orderly, and capable of adaptation to the purposes of man. In the physical and chemical laboratories you have been brought into personal contact with these forces, and have learned to direct their operations, as you have watched the manifold effects of energy on the infinite varieties of matter.

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When you have completed your course of study and leave this college, crowned, I hope, with academic distinction, there will be your future career in life to choose and follow. A small number among you may, perhaps, be so circumstanced as to be able to devote yourselves entirely to original scientific research, selecting such branches of inquiry as may have specially interested you here, and giving up your whole time and energy to investigation. A much larger number will, no doubt, enter professions where a scientific training can be turned to practical account, and you may become engineers, chemists, or medical men. But in the struggle for existence, which every year grows keener among us, these professions are more and more crowded, so that a large proportion of your ranks may not succeed in finding places there, and may in the end be pushed into walks in life where there may be little or no opportunity for making much practical use of the knowledge in science which you have gained here. To those who may ultimately be thus situated it will always be of advantage to have had the mental training given in this institution, and it will probably be your own fault if, even under unfavorable conditions, you do not find, from time to time, chances of turning your scientific acquirements to account. Your indebtedness to your professors demands that you shall make the effort, and, for the credit of the college, you are bound to do your best.

Among the mental habits which your education in science has helped to foster, there are a few which I would specially commend to your attention as worthy of your most sedulous care all through life.

In the first place, I would put accuracy. You have learned in the laboratory how absolutely essential this condition is for scientific investigation. We are all supposed to make the ascertainment of the truth our chief aim, but we do not all take the same trouble to attain it. Accuracy involves labor, and every man is not gifted with an infinite capacity for taking pains. Inexactness of observation is sure sooner or later to be detected, and to be visited on the head of the man who commits it. If his observations are incorrect, the conclusions he has drawn from them may be vitiated. Thus all the toil he has endured in a research may be rendered of no avail, and the reputation he might have gained is not only lost but replaced by discredit. It is quite true that absolute accuracy is often unattainable; you can only approach it. But the greater the exertion you make to reach it, the greater will be the success of your investigations. The effort after accuracy will be transferred from your scientific work to your everyday life and become a habit of mind, advantageous both to yourselves and to society at large.

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In the next place, I would set thoroughness, which is closely akin to accuracy. Again, your training here has shown you how needful it is in scientific research to adopt thorough and exhaustive methods of procedure. The conditions to be taken into account are so numerous and complex, the possible combinations so manifold, before a satisfactory conclusion can be reached. A laborious collection of facts must be made. Each supposed fact must be sifted out and weighed. The evidence must be gone over again and yet again, each link in its chain being scrupulously tested. The deduction to which the evidence may seem to point must be closely and impartially scrutinized, every other conceivable explanation of the facts being frankly and fully considered. Obviously the man whose education has inured him to the cultivation of a mental habit of this kind is admirably equipped for success in any walk in life which he may be called upon to enter. The accuracy and thoroughness which you have learned to appreciate and practice at college must never be dropped in later years. Carry them with you as watchwords, and make them characteristic of all your undertakings.

In the third place, we may take breadth. At the outset of your scientific education you were doubtless profoundly impressed by the multiplicity of detail which met your eye in every department of natural knowledge. When you entered upon the study of one of these departments, you felt, perhaps, almost overpowered and bewildered by the vast mass of facts with which you had to make acquaintance. And yet as your training advanced, you gradually came to see that the

infinite variety of phenomena could all be marshaled, according to definite laws, into groups and series. You were led to look beyond the details to the great principles that underlie them and bind them into a harmonious and organic whole. With the help of a guiding system of classification, you were able to see the connection between the separate facts, to arrange them according to their mutual relations, and thus to ascend to the great general laws under which the material world has been constructed. With all attainable thoroughness in the mastery of detail, you have been taught to combine a breadth of treatment which enables you to find and keep a leading clew even through the midst of what might seem a tangled web of confusion. There are some men who can not see the wood for the trees, and who consequently can never attain great success in scientific investigation. Let it be your aim to master fully the details of the tree, and yet to maintain such a breadth of vision as will enable you to embrace the whole forest within your ken. I need not enlarge on the practical value of this mental habit in everyday life, nor point out the excellent manner in which a scientific education tends to develop it.

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In the fourth place, I would inculcate the habit of wide reading in scientific literature. Although the progress of science is now too rapid for any man to keep pace with the advance of all its departments, you should try to hold yourselves in touch with at least the main results arrived at in other branches than your own; while, in that branch itself, it should be your constant aim to watch every onward step that is taken by others, and not to fall behind the van. This task you will find to be no light one. Even were it confined to a survey of the march of science in your own country, it would be arduous enough to engage much of your time. But science belongs to no country, and continues its onward advance all over the globe. If you would keep yourselves informed regarding this progress in other countries, as you are bound to do if you would not willingly be left behind, you will need to follow the scientific literature of those countries. You must be able to read at least French and German. You will find in these languages a vast amount of scientific work relating to your own department, and to this accumulated pile of published material the journals of every month continue to add. In many ways it is a misfortune that the literature of science increases so fast; but we must take the evil with the good. Practice will eventually enable you to form a shrewd judgment as to which authors or papers you may skip without serious danger of losing any valuable fact or useful suggestion.

In the fifth place, let me plead for the virtue of patience. In a scientific career we encounter two dangers, for the avoidance of which patience is our best support and guide. When life is young and enthusiasm is boundless; when from the details which we may have laboriously gathered together we seem to catch sight of some new fact or principle, some addition of more or less importance to the sum of human knowledge, there may come upon us the eager desire to make our discovery known. We may long to be allowed to add our own little stone to the growing temple of science. We may think of the pride with which we should see our names enrolled among those of the illustrious builders by whom this temple has been slowly reared since the infancy of mankind. So we commit our observations to writing, and send them for publication. Eventually we obtain the deep gratification of appearing in print among well-known authors in science. Far be it from me to condemn this natural desire for publicity. But, as your experience grows, you will probably come to agree with me that if the desire were more frequently and energetically curbed, scientific literature would gain much thereby. There is among us far too much hurry in publication. We are so afraid lest our observations or deductions should be forestalled—so anxious not to lose our claim to priority, that we rush before the world, often with a half-finished performance, which must be corrected, supplemented, or canceled by some later communication. It is this feverish haste which is largely answerable for the mass of jejune, ill-digested, and erroneous matter that cumpers the pages of modern scientific journals. Here it is that you specially need patience. Before you venture to publish anything, take the utmost pains to satisfy yourselves that it is true, that it is new, and that it is worth putting into print. And be assured that this reticence, while it is a kindness to the literature of science, will most certainly bring with it its own reward to yourselves. It will increase your confidence, and make your ultimate contributions more exact in their facts as well as more accurate and convincing in their argument.

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The other danger to which I referred as demanding patience is of an opposite kind. As we advance in our career, and the facts of our investigations accumulate around us, there will come times of depression when we seem lost in a labyrinth of detail out of which no path appears to be discoverable. We have, perhaps, groped our way through this maze, following now one clew, now another, that seemed to promise some outlet to the light. But the darkness has only closed around us the deeper, and we feel inclined to abandon the research as one in which success is, for us at least, unattainable. When this blankness of despair shall come upon you, take courage under it, by remembering that a patient study of any department of Nature is never labor thrown away. Every accurate observation you have made, every new fact you have established, is a gain to science. You may not for a time see the meaning of these observations, nor the connection of these facts. But their meaning and connection are sure in the end to be made out. You have gone through the labor necessary for the ascertainment of truth, and if you patiently and watchfully bide your time, the discovery of the truth itself may reward your endurance and your toil.

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It is by failures as well as by successes that the true ideal of the man of science is reached. The task allotted to him in life is one of the noblest that can be undertaken. It is his to penetrate into the secrets of Nature, to push back the circumference of darkness that surrounds us, to disclose ever more and more of the limitless beauty, harmonious order, and imperious law that extend throughout the universe. And while he thus enlarges our knowledge, he shows us also how Nature may be made to minister in an ever-augmenting multiplicity of ways to the service of

humanity. It is to him and his conquests that the material progress of our race is mainly due. If he were content merely to look back over the realms which he has subdued, he might well indulge in jubilant feelings, for his peaceful victories have done more for the enlightenment and progress of mankind than were ever achieved by the triumphs of war. But his eye is turned rather to the future than to the past. In front of him rises the wall of darkness that shrouds from him the still unknown. What he has painfully accomplished seems to him but little in comparison with the infinite possibilities that lie beyond. And so he presses onward, not self-satisfied and exultant, but rather humbled and reverential, yet full of hope and courage for the work of further conquest that lies before him.—*Nature*.

SHALL WE TEACH OUR DAUGHTERS THE VALUE OF MONEY?

By ALEXANDRA L. B. IDE.

I am induced to write a few lines on this subject by a remark recently made to me by a widow of large property. In speaking about the management of her money she said: "As to myself, I leave everything to my business man or agent. I would not know if my tax bills were correct. He gives me plenty of money to spend on my charities; why should I trouble myself about the details?" Evidently it had never occurred to her that she might be spending her principal; that some day she might wake up to the fact that her fortune had been dissipated. Another rich woman, to whom I made the remark that certain bonds were bought at par, inquired, "Is that the same thing as buying them on a margin?" Now here were representative women of New York society, both belonging to excellent families, and to all appearances well educated. It is amazing that such profound ignorance on ordinary business matters exists. In conversation with many other wealthy women I discovered that it was very much the exception to find a woman who possessed the slightest knowledge of money matters.

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Now, why should these things be? The time has passed for a young girl to be brought up a "perfect fool." Let her not waste the beautiful morning of her life in profitless and frivolous occupations. The reason often given as excuse for the ignorance of many women is, so few comparatively have any money to keep, therefore it is useless to teach them.

True, it is unusual to find a young girl with an independent fortune; but she may marry rich, and what a help she would be to a sensible man if she were capable of aiding him in his business affairs! Again, she might be left a widow, and have the entire direction of her husband's property. No knowledge is ever lost. The more one knows, the more one realizes how little one does know. I maintain that a woman's intellect is perfectly capable of coping with and understanding business affairs. In some matters she is far shrewder than the average man, and in many cases her quick insight sees at a glance that which man requires time to penetrate. Only give her half a chance. I do not wish for a moment to be understood as advocating women becoming stockbrokers or lawyers; nothing could be more unnatural or unsuitable. It seems to me only in accordance with the wishes of a reasonable woman to participate with her brothers in such rudimentary knowledge as will enable her to oversee or take the entire charge of her own property. Take, for example, a well-to-do New York business man. He has acquired through his own industry and shrewdness a large fortune. He maps out the education for his children. His sons are sent to the best schools, and afterward to college. He determines that no expense shall be spared to fit them for their future career.

For his daughters expensive foreign governesses are engaged, who teach them the languages, music, and other accomplishments. Or the daughters are sent to some high-priced fashionable school, where they are put through a course of training to enable them to "shine in society." Having reached the age of eighteen, the daughter returns to the parental roof.

What does she know in exchange for the large sum of money her education has cost? Usually her penmanship is bad and illegible. Her knowledge of arithmetic very slight. These two essentials of education are not her forte.

But she is a good dancer, and perhaps at the assembly or some such function the father's heart has swelled with pride as he noticed how eagerly she was sought as a partner. She can sing French songs, probably those which are rather *risqué*. She can converse, perhaps, in two or three different modern languages. As a general rule her French can scarcely be understood by the foreign *attachés* at Newport. The girl is absolutely unequipped for *real* life, and the man of sense, who has passed the boyish age and is looking for a partner for life, knows *this*. Possibly this is one cause why there are comparatively few marriages in our best society. What man is less likely to seek as wife a woman who knows something about the care and value of money? It is strange that a father should be so blinded to the best interests of his daughter. Is it because he considers her intellect so far below that of his son that he makes no effort to instruct her in regard to the care of money? The only thing she knows about money is how to spend it—generally on herself, for clothes and jewels. Perhaps on the first of the month, when the bills for his daughter's extravagance pour in on him, he is vexed; but if his fortune is large, and it is no inconvenience for him to pay them, he generally does so without a murmur. "Let her have a good time while she is young," he soliloquizes.

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But stop a moment and consider. What you sow you reap is as true in this material concern as in the world of agriculture. The fond parent by his indulgence and neglect is sowing the seeds of extravagance, perhaps those of want. Years hence she may reap the fruit of his ill-judged kindness in fostering habits of reckless expenditure.

In a few years the father dies; his property is divided; the daughter receives her share. If she is married to a good business man who has time to take charge of her fortune, possibly, during her husband's lifetime, the difficulty is bridged over. But the chances are she may not be married, or again the man she has selected as husband may be worthless as a business man. It is not to be expected that a brother (even if she is fortunate enough to possess one), however kind, will overburden himself with the manifold details of looking after the property of a sister. He has his own interests, which demand his attention. He thinks his duty accomplished when he has chosen a man to look after his sister's affairs whom he *believes* to be reliable. The person whom he has appointed as guardian over his sister's interests may have an honest and high character, but that is no guarantee that in a moment of weakness he may not yield to the temptation of abusing the trust. He knows the woman is absolutely ignorant of how her affairs are being conducted, and in all probability would not be the wiser if he appropriated some of her fortune to his own uses. Her very ignorance is his security. Who can not recall several such cases? If each day for half an hour the father had instructed his child in the essentials of business—how to calculate interest quickly, the manner of filling out a lease in renting property, explaining about mortgages, and giving her a lesson as to what were the best investments—she would know enough to steer clear of the many sharks and vultures which usually find her a ready prey. The woman who does not know the difference between a registered and coupon bond should be ashamed to acknowledge such ignorance. A parent's neglect in teaching his child about monetary affairs is culpable, almost amounting to a crime. There is nothing so costly as ignorance. This very fortune which you have taken infinite pains to accumulate will be perhaps dissipated, owing to your want of forethought in imparting the requisite knowledge to your child. This information she will in after years buy for herself at a heavy premium. If knowledge is power in other matters, it is more than ever true in monetary affairs. Power to keep your fortune is a power worth having, and more difficult to acquire than to make a fortune. Let a girl but try to earn five dollars, and she will see the task is not an easy one. Then, unless she be a fool, she will realize that what is so difficult to obtain should not be wasted.

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I recall the case of a fashionable woman in New York society which came under my own observation. Her husband told me he had deposited in a bank a large sum of money for his wife to draw on, given her a bank and check book, explained and showed her how to draw checks. He very sensibly thought that it would be a far better plan for her to pay her bills herself, instead of coming to him every time she needed money. His relief from being her almoner was of short duration, for in less than a month she came to him, and, throwing the check and bank books on his library table, told him it was too much trouble—she could not make head or tail of it; she wished to return to the old system! He could pay her bills in future. This woman had been married twenty years. Too much trouble, is it? Yes, I believe this is the keynote why women are so ignorant. They are lazy, pure and simple. The details of business are too dry and uninteresting. It is so much easier to have some one else do the work for you. So much less exertion to read a novel, or ride the wheel with some attractive man. "How prosaic," you say, "to add up account books, balance check books, and calculate whether your tax bill is correct when your property is assessed at the rate of 2.01!"

I believe, if the truth were told, half the divorces in which the reason given is incompatibility of temper arise from the fact that women know nothing of the value of money. I am not speaking entirely of women who have their own property, but also of those who are dependent on a husband's income. The wife has a vague idea that there is an inexhaustible supply of cash somewhere! What man can not tell you how worried and harassed he felt when his wife came to him for money to spend on nonessentials, and which he could ill afford? If he attempted to remonstrate with her he probably received a rude or angry reply! The wife, perhaps, had been used to an indulgent father, who gratified her every whim. She overlooks the fact that a father and husband are two vastly different beings, and require different treatment. To some women a husband's value decreases when he can no longer supply them with finery. Their alleged love soon wanes, and a divorce is sought on any pretext.

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It is easy to see that by a knowledge of business affairs a woman can dispense with the services of an agent or trust company, whose salary thus being saved is added to her income. In case a woman is fitted by a proper education for so doing, who could attend to her own interests better than herself, as she is the party interested? The phrase, "If you wish anything well done, do it yourself," is never better exemplified than in this case. Lastly, but not least, in saving our money it need not be from a miserly spirit; but the more we have, the more we can profitably give away. What pleasure equals that of relieving real distress, and of helping others? Did not our Saviour himself set the example of saving when, after performing the miracle where he fed the multitude with the loaves and fishes, he said: "Gather up the fragments that remain. Let nothing be lost."

SKETCH OF CLÉMENCE ROYER.

By M. JACQUES BOYER.

Madame Clémence Augustine Royer was born at Nantes, France, April 21, 1830, of an old Catholic family. When she reached a suitable age she was sent to school at the Sacré Cœur, where she received the most of her education. Very shortly after coming out of the convent she abandoned the religious doctrines they had tried to inculcate in her there, and, like so many young persons, was attracted to poetry. But her literary efforts as a whole received very little attention, and she would never have been successful if she had only teased the Muse. Happily, she applied herself, about 1850, to more serious studies, and went to England, where she spent several years and acquired a thorough knowledge of the language of Shakespeare. She removed thence to Switzerland, and there found her definite vocation. The natural sciences, philosophy, and political economy from that time engaged her attention.

The opening of Madame Royer's course of lectures to women on logic at Lausanne in the winter of 1859 and 1860 attracted much notice. The first lecture was published under the title of an Introduction to Philosophy, and brought most flattering praise to the author from contemporary students. In an animated style the disciple of Jean Jacques Rousseau, the apostle of bold and ingenious ideas, was already beginning to declare herself. In the meantime she collaborated on the journal *The New Economist*, which the historian and sociologist Pascal Duprat had just founded.^[41]

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At the close of 1860, the Canton of Vaud having opened a competition on the Principles of Taxation, "the little lady with a straw hat," as her neighbors familiarly called her, handled the subject so thoroughly that her memoir, entitled *Théorie de l'Impôt et Dime sociale* (Theory of the Impost and Social Tithe, 1862), won her the honor of dividing the prize with Proudhon. While not all the ideas set forth in this work were new, she took care at least to co-ordinate the systems of her predecessors, to select from the one and the other of them what was good in them, and to condense into a homogeneous whole works which were scattered hither and thither. But we will pass over these books of her youth to dwell more at large on that part of her work which will assure Madame Royer an honorable place among the most zealous promoters and ablest defenders of the Darwinian theories.

Her first effort in this line was to translate into French, in 1862, the *Origin of Species* of the great English naturalist, preceding the work with a preface which in itself alone constituted an excellent summary of the doctrine of evolution. She pointed out the results which logically follow from the transformist theory. She did not conceal from herself that in doing thus she would be the object of attacks from the immobilist and ecclesiastical parties still so numerous thirty years ago in all civilized countries; but she flattered herself, too, and with just reason, that she would furnish the liberals and progressives of France with a powerful weapon. In this introductory chapter she characterized the original and strong personality of Darwin in appropriate terms, saying: "While he has not the brilliant qualities of a Cuvier as a writer or a professor, he is at least a worthy heir of the profoundly philosophical science of the two Geoffroys Saint-Hilaire ... one of those workmen who cut their stone with an indefatigable courage. But there are also thicker and heavier stones, without beauty or apparent grace, which are designed to be hidden at the base of an immense edifice, like the massive columns with which the architects of the middle ages decorated the crypts of their Gothic cathedrals. It is truth in the rough. He does not impose his condition, but communicates it and proves it. If it is certain, he affirms it; when he supposes, he says so; when he doubts, he acknowledges it." She then passes to the exposition of Darwinism as responding to one of the noblest aspirations of the mind, the preliminary step to the accounting for the world of organized beings, as astronomy, physics, and geology have explained the origin of inanimate substances. In effect, the illustrious Englishman, connecting the domain of botany and zoölogy with the action of second causes, sought first to comprehend the genesis, and then the evolution, in the same way that astronomers and geologists teach us concerning the origin of our globe and the successive phases through which its surface has passed.

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Not only did Madame Clémence Royer initiate us into transformism. In her masterly introduction she went still further. Carrying the exposition to its final consequences, she provoked a useful revolution in the ideas then current. She dared to say what many men of science would only have left to be inferred. Her translation, revealing the name of Darwin to the French public, who hardly knew of it at that period, gave the occasion for a very active conflict between the partisans of "creationism" and the Nantese philosophy. The success of this work was so great as to induce her to complete her preface by publishing a few years afterward a work wholly her own, *Origine de l'Homme et des Sociétés* (Origin of Man and Societies, 1870), which, being her best production, deserves a special analysis. With the assistance of documents collected by the most famous anthropologists, Madame Royer reconstitutes the history of the primitive ages of mankind, and after studying its origins and development she seeks for the bonds that connect the great human family with the rest of living Nature; and finally forecasts its future from its past.

In the first part she takes up the question of the origin of life and of its transformations upon the earth. The living species are grouped around man, who is the topmost shoot of the gigantic "tree of life." Two laws regulate the transmission of life—the law of heredity and the law of variability. The former assures the continuation of the type, and the latter variety in its modifications. The organic kingdom as a whole oscillates between these two contrary rules which fix limits each upon the other and which suffice to explain the successive appearance through the ages of different forms of life. The organic individual is thus the solution of a problem in algebra set to Nature. Atavism is the constant quantity, and the force of variation is the perpetually changing unknown factor. The problem is therefore complex, but the principles to which the variable is subject resolve themselves into a series of partial laws which are deduced from an aggregate of

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observations, and which, according to our author, one may summarize as he goes.

Most of the variations reveal themselves in the embryo during the fœtal period. But after its birth the young product is affected not only by the ambient medium, but also by the consequences of the reproductive act. The latter, in fact, having impressed the initial movement upon its organism, reacts incessantly against the modifying influences of the ambient, and atavism prevails as always the resultant unless important accidents come in to change the course.

It is only necessary to add a few experimental considerations to complete a rapid sketch of the laws of variability. First, correlation of growth: Homologous organs tend to vary in the same direction, and together. Are the fingers joined or divided? The hand follows similar variations. Then there is a compensation of growth which prevents the excess of the preceding rule; when one organ is developed, another is atrophied. Also vital competition. Every organized being must be in harmony with the conditions of its existence or it will not subsist; the monster may appear, but will not live. Lastly, by virtue of natural selection, the individual must likewise possess the means of perpetuating its species. Otherwise, a series of transformations will come to pass in the course of successive generations, improving the organism and adapting it more and more to the exigencies of its habitat. The least prolific species of to-day fulfill these conditions so well that they of themselves alone would cover the surface of the earth if their multiplication was not checked by that of other species. But as only a limited quantity of life is possible on our planet, the less well-adapted organisms perish. The struggle therefore produces a selection. It is hence presumed that in the same species only varieties manifesting tendencies in most complete harmony with the method of their existence will be preserved, all the intermediate varieties being destroyed. Consequently, if we push the doctrine of Darwin to its extreme limits, we arrive at the idea, now rejected, that in the beginning only a single germ arose at one point on the globe. All the analogies, on the other hand, lead us to suppose that the earth was fruitful over its entire surface.

This leads us to inquire how life appeared on the earth. The debate between the heterogenists and the panspermists has been long vain, because the question has been laid before them in insoluble terms. In order to resolve it, therefore, we must take ourselves back in thought thousands of thousands of centuries in the past. A thin crust of red-hot lava, hardly solidified, extended over the incandescent nucleus of our globe. An eternity then passed before the fiery sphere was forever confined within its coffin of granite. The metalloids dominant in this chaos of affinities and repulsions were then floating in an irrespirable atmosphere along with a mass of aqueous vapors. At the end of many millions of years, the waters definitely took their place around the globe. But who can ever tell what useless abortions, to be destroyed as soon as they were created, arose in these oceans saturated with anomalous substances? The first germs of life doubtless arose from the thick proliferous stratum which was developed under the pressure of a dense atmosphere in contact with liquids still warm, incessantly traversed by electric currents of unimaginable intensity. It was a sprout that arose everywhere at once. But in those innumerable spontaneous efforts, continued during the enormous length of time required to purify the atmosphere from its acrid vapors and the seas from their foreign matters, only a small number of these germs achieved a beginning of vegetation. This, according to Madame Royer's theory, was the way life began on the globe.

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The author next examines the complete series of the phases of evolution gone through by the species, and then the development of the mental faculties, the chief feature of difference which in the view of some thinkers creates a gap between man and the rest of the animal kingdom. She demonstrates that the primary qualities of mind are identical in all living creatures, even in those of least development. The intelligence of man is simply superior to the mental organism of the animal. This is, however, only a relative superiority, not differing in nature from the animal's intelligence, but only in form and intensity.

After relating the history of man in prehistoric times, our philosopher gives, in the second part of her work, the present picture of the races as their physical characteristics and their social orders differentiate them so profoundly: At the top, the white race, the last flower of the genealogical tree, to which all the great nationalities belong. By the side of it, its two diverging branches, the Turanians (Hungarians, Finns, and Turks) and the Aramæans or Semites (Jews, Arabs, and Syrians). Then come the three—Hyperborean, Mongolian, and Sinitic—branches of the yellow stock, who inhabit eastern and northern Asia. We find also the Malays covering the surface of the two southern peninsulas of Asia and Oceania. They constitute a lateral ramification, which, together with the red or copper-colored race of North America, may have had the same point of departure as the Mongols. Lastly comes the negro race, which has been separated a much longer time from the common stock from which man has diverged.

Further on, Madame Royer discusses the anatomical relations of man and the ape, with the conclusion deduced as resulting from phenomena of observation that the human family is only a term in a series of which the different primates are the other steps. In short, the further we go back in the past of primitive man, the more we meet manifestations of passions as ferocious as base. This is, moreover, easily conceivable. The savage, at war with Nature and his like, and placed in conditions of life common to the animal world, has in the beginning all its bad instincts.

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The end of the second part of *L'Origine de l'Homme et des Sociétés* is devoted to the most complex problem of anthropology—that of the beginning of speech and the origin of language. Man, in the view of the author, first makes his wants and feelings known to other beings by a series of signs. The three primordial faculties—feeling, thinking, and wishing—were the point of

departure, the cause and the rule of all languages that man has created in his entire progress. As his mind has shaped a new idea, it has found a new sign to express it; but the process varying with the race, time and the environment have produced the diversity of tongues which we observe. In the beginning a more or less complicated cry suffices to express the thought in its original syncretism. Then, under the influence of reflection continued through ages, from generation to generation, it becomes transformed and decomposed into various elements. Every noun was primarily an adjective-substantive. For example, thunder was designated by imitating it; the horse, by its neighing and the sound of galloping. The relations of place, possession, and those of many other kinds were probably expressed by the look, the attitude, a motion with the hand, etc. Ideas of number were developed slowly. The earliest languages contained only about a hundred words, and these sufficed for centuries for the needs of human thought, confined within the narrow experience of a generation. It results from these facts that in every sense the formation of languages is a consequence of social relations. But here rises a question as important as difficult to answer: When did man begin to speak? From the harmony between the anthropological classifications deduced from philological research and those drawn from the labors of the physiologists it appears evident that the spontaneous and primitive constitution of the first elements of language was, among all known human races, posterior to their geographical and ethnical separation. In other words, local varieties had already been formed, and men had acquired the anatomical differences that distinguish them to-day before they conquered the faculty of speech. However it may be with these hypotheses, we may assent fully to the conclusion of the chapter that man will never deserve the name of the reasoning animal till he shall possess a logical and single language for all the members of the great human association. May this dream be realized by the destruction of the barriers which now divide so many peoples!

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In the third part of the work, Madame Royer treats of the development of human society. Everything permits the supposition that from a very remote period the anthropoid primate that served as the root stock of man became omnivorous, with a predominance of carnivorous tastes. These conditions of life therefore invoked an at least rudimentary social instinct—that is, animals lived in troops collected under chiefs, with a tactics for mutual defense. The most ancient documents, in fact, show the human species living in rival or allied tribes. Hunting and fishing were the principal business of these primitive races, which relied for assistance at first on their agility, muscular strength, and arms of stone of a workmanship still in its infancy. Flint was then very roughly cut. But now a great advance was achieved for man, a step toward industry and civilization. This second stage was the discovery of fire, an immediate consequence of the cutting of flints, when sparks would fly out at each blow. Yet a later epoch probably had to be reached for the real employment of fire in cooking food. Previous to that it could serve man only for warming himself, or for protecting himself at night against wild beasts.

Next came the earliest industries—the potter's art, the making of rude clothing, and the construction of habitations; and about this time the instinct of property begins to develop. For a long time there are no other securities than force. On the other hand, the diversities of the faculties, which are very unequally distributed among the various races, and even among the different individuals of each of them, create social inequalities, the chief cause of the crime, wars, and misery with which every page of the history of man is soiled, and from which the original organization of civil society sprang.

At the close of her treatise the eminent anthropologist states the formula of the highest social prosperity: she believes that it resides in an equal liberty for each member of a national collectivity and in the free play of individual initiatives. Man will work in as large a sphere of action as the right of another leaves him, striving to broaden his place at the feast of life. Each one will climb the social ladder in his own way and will fix himself on the step on which his aptitudes will meet the best reward. Each individual will therefore gain a large sum of well-being, and the species will possess a total maximum of enjoyment.

Such, in broad outline, is the substance of this book, which naturalists and philosophers have consulted now for many years. It is not within the province of our sketch to dwell upon any of the bold assertions and hypotheses in it that have been invalidated by later geological discoveries; and, notwithstanding a few errors in detail, almost inevitable in a book of the kind, the *Origine de l'Homme* is, as a whole, a work as vigorously thought out as clearly and generously written.

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Madame Clémence Royer has further occupied herself with special researches on subjects of the same nature. Their results have been published in the highly esteemed review, the *Bulletin of the Société d'Anthropologie*. The most important of these memoirs relate to the Craniology of the Quaternary Period, the Celts, the Origin of the Different Human Races (1873), and the Domestication of Monkeys (1887). The last work was published at the time of the appearance of a book by M. Victor Meunier,^[42] a believer in the possibility of domesticating the simian race. His proposition, received in France as a kind of a joke, taxed the genius of the Parisian caricaturists, because the author had suggested that newborn children be nursed by monkeys, whose milk was most like that of the human mother. Of course it was an easy subject to joke about. Madame Royer showed how little originality there was in this book. We might, she said, undoubtedly succeed in educating monkeys, and they would at the end of many generations be in certain cases superior to the dog and the horse. Unfortunately, the struggle for existence opposed the adoption of the Utopian idea. The place for each human recruit at the social table is now too narrow for any part of it to be left for "our lower brethren."

Anthropological sciences were not the only ones to which the encyclopedic mind of our learned

philosopher was attracted. A few years ago she returned to her earlier studies, and collaborated on the *Nouveau Dictionnaire d'Économie Politique* of Léon Say (1891-'92). The most profound article she wrote for this work was that on the word positivism. According to it, the Positive Philosophy dates, not from Auguste Comte, who is believed to have introduced it, but from Bacon; for its essential features may be found in the *Novum Organum* and the *Scientia nuova*. Furthermore, Madame Royer found that Comte "emasculated" the doctrine of the famous chancellor. The principal dogma of the system is the impossibility of knowledge of first causes by our reason. This is an error, says Madame Royer. Two distinct ideas have been confounded in the term first causes: first, the permanent cause of phenomena, their essential "substratum," the discovery of which man may perhaps some day reach; and, second, the supposed primary term of each phenomenal law. But if the world is eternal, this last does not exist, since "the eternity of the substantial involves the eternity of its effects." Yet, while she attacks Comte's errors in the sphere of sociology, she renders full justice to his Course of Positive Philosophy, which was often in advance of its time in respect to the exact sciences. Among other of Madame Royer's publications we may cite *Zoroastre, son Époque et sa Doctrine* (Zoroaster, his Epoch and his Doctrine, two volumes, 1875); *Les Âges Préhistoriques* (The Prehistoric Ages, 1876); *La Terre et ses Anciens Habitants* (The Earth and its Ancient Inhabitants, 1891), a sort of summary of recent progress in paleontology, and of facts that may be derived from the study of living beings; and *Les Variations Séculaires des Saisons* (Secular Variation of the Seasons, 1892), a little work in which the author endeavors to confirm by observation a theory that climatic variations are dependent, in the meteorological sense, on planetary movements. She showed, for example, that in the cold winter of 1879-'80 the distribution of the planets around the sun was precisely that which should give the greatest degree of cold for our hemisphere.

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We notice also her occasional contributions to different periodicals: to *Le Temps*, the *Revue des Revues*, the *Journal des Économistes*, etc. Her last two treatises were published in 1895: *La Matière* (or Matter), and *L'Inconnaissable* (or The Unknowable).

So great intellectual activity has given Madame Royer a first place among women as students of science. Hence, on March 10, 1897, her numerous admirers and friends offered her a jubilee banquet, under the chairmanship of M. Levasseur, member of the Institute of France. The toasts spoken to on this occasion retraced the brilliant career of the heroine of the feast; and, as the chairman justly declared, the occasion was "the glorification of woman's knowledge." Madame Clémence Royer is at present living a very retired life in the *Maison de Retraite* founded by the Duchess Galigani at Neuilly, near Paris, where she enjoys the rest earned by a half century of persevering labor. Her body is feeble, but her ample brow and her yet lively eyes seem still to have preserved the recollections of the struggles of other days.

DR. SHELDON JACKSON, superintendent of Government schools in Alaska, corrects a report that has been published, that his experiment in naturalizing reindeer in that Territory has failed. Three hundred and twelve of the five hundred and twelve head imported died, it is true, at Seattle and Haines, "because of a combination of circumstances and Government red tape," but the two hundred and twenty-eight deer that were allowed to reach the moss, fifty miles from the coast, are doing well, and will be used next winter in carrying the mails. Instead of scarcity of moss, the pasturage is more abundant than in Lapland or Siberia, and the reindeer thrive better than they did in their native habitat.

Editor's Table.

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WORDS OF A MASTER.

The address, which we print elsewhere, delivered by Sir Archibald Geikie to the students of Mason College, Birmingham, is one to which we feel it a duty to draw special attention. It would be difficult, we think, to state more lucidly than the eminent author has done the advantages to be derived from a course of scientific study, and the principles which must be kept in view, not only during the period of study, but through life, if a training in science is to have its best results.

The address begins with a few words of caution as to the drawbacks which are apt to attend on the exclusive, or nearly exclusive, pursuit of science. In the reaction which the present age has witnessed against the old literary and linguistic curriculum of studies, a tendency is manifesting itself to undervalue the older learning. This Sir Archibald considers to be a matter for serious regret. He recognizes the impossibility of combining any large amount of literary or philological study with the requirements of an extensive scientific course; but he advises those who make choice of the latter to "cherish the literary tastes they have acquired, and to devote themselves sedulously to the further cultivation of them during such intervals of leisure as they may be able to secure." A training in science, he observes, "admirable as it is in many ways, fails to supply those humanizing influences which the older learning can so well impart." Times will therefore come, even to the most enthusiastic student, when "scientific work, in spite of its absorbing interest, grows to be a weariness"; and it is then that the value of any literary culture which may

have been received at school or college will be appreciated.

It is a quite true remark that "men who have been too exclusively trained in science, or are too much absorbed in its pursuit, are not always the most agreeable members of society." It is also true that "one result of the comparative neglect of the literary side of education by many men of science is conspicuously seen in their literary style," which is not infrequently so "slipshod, ungrammatical, and clumsy that even the meaning of the authors is left in doubt." This is a great evil under the sun: a man goes through a vast amount of labor to ascertain facts and discover their meaning; and when he is ready to transfer the knowledge that he has gained to other minds he lacks the skill to do it in any satisfactory manner. Yet so far is it from being the case that there is any necessary incompatibility between scientific and literary cultivation, that several of the most distinguished scientific investigators have ranked among the best writers of the day. We need only cite such names as Sir John Herschel, Lyell, Darwin, Huxley, Tyndall, Clifford, and Sir Archibald Geikie himself: to read any of these is a pleasure from a literary no less than from a scientific point of view. No very satisfactory excuse can therefore be made for those scientific writers who can not compass a style of reasonable perspicuity and elegance. We can only think of them as having fallen victims to the hurtful error that literary style is of no advantage to a scientific man.

The caution which the address contains against taking too utilitarian a view of science is timely and judicious. We do not believe the intention of the author is to encourage the prosecution of alleged scientific researches independently of all assignable human motive; but he would have all the main lines of scientific inquiry pursued in a liberal and disinterested spirit, in the belief that the enlargement of knowledge can not but subserve in some way or another, and sooner or later, the interests of the human race. He feels that the true scientific spirit is not one that makes pecuniary gain its chief object. True types of the scientific worker are to be found in Michael Faraday and the elder Agassiz, who was "too busy to make money"; and the student of science who can not to some extent work in the spirit of these men may as well recognize that it is not scientific truth he is after but money. The greatest advances in Science, it is almost needless to say, have been made by those who were serving her not for the lust of gain, but for the love of discovery—that is to say, by men like Copernicus, Galileo, Harvey, Cavendish, Newton, Franklin, Jenner, Watt, Darwin, and Pasteur; and if we would know what science is, it is the lives, characters, and labors of such men as these that we should study, and not the achievements of merely successful patentees.

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Another danger to which the student of science is exposed is that of paying little or no attention to any department of science save that of which he is making a specialty. It is therefore of great importance that the courses of study laid out in science colleges should at the outset be sufficiently broad to afford a thorough grounding in the leading principles of all the sciences and in the application of scientific method to every field of inquiry. Only in this way can a true sense of the power and universality of science as a method of thought and an engine of the human mind be obtained. Why is it that we are often so little impressed with the intellectual character of this or that noted specialist? The reason, we take it, is that his mind lacks breadth; he knows his own field of observation, but seems to have little sense or appreciation of what lies beyond it. It may have been some one of this type who suggested to Wordsworth his idea of an "ever-dwindling soul"; certain it is that a man may, by the too exclusive pursuit of a narrow line of thought and inquiry, fatally cramp his mind and dim his spiritual vision.

The foundation of all science is observation, and Sir Archibald rightly dwells upon the supreme importance of cultivating and developing the observing faculty to the utmost extent. He states that a man may possess a colossal intellect while his faculty of observation may be of the feeblest kind, and gives as an example a very eminent mathematician, lately deceased, who used to make the most ludicrous mistakes as to time and place. Upon this point we feel like venturing a little dissent. We doubt whether there ever was a colossal intellect apart from a considerable development of the power of observation; and that a great mathematician should take very little notice of what was going on in the world about him would only show that his powers of observation were otherwise engaged. Take him in his own field, and what a multitude of things he would observe which a man of inferior intellect, occupied with the same studies, would overlook! It would be a somewhat rash thing to undertake to cure an Archimedes or a Newton of that absent-mindedness which, to the world at large, looks like a deficiency of observation. In such cases as these the mind that is absent here is present elsewhere; and what it is doing there the world will in due time find out. It is impossible, we hold, for any one man to be observant in all directions; if he is, it is certain he will not have a colossal intellect. Still, the truth which should be borne in upon every student's mind is that if he would make independent progress he must be an independent observer. He must take in once for all the truth that the materials needed for scientific construction lie afield, and that he must keep his eyes open in order to see and distinguish them. At every moment the man of science may say, "There are more things in heaven and earth than are dreamt of" in any philosophy yet formulated; and some of those things he should aim at discovering for himself. Any mind that is once thoroughly interested in any branch of study will be observant, and conversely a certain practice in observation may create an interest not before felt in a certain department of study. It may also be remarked that the dividing line between observation and deduction is very narrow and more or less shadowy; and therefore to cultivate the logical faculty is to create an appetite for observations, or at least for facts. The logical mind sees where facts are *wanting*, and will not be happy till it gets them.

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As might be expected, Sir Archibald Geikie makes a special application of what he has to say on

the need of observation to his own science of geology—a study which is a constant challenge to the observing eye and the constructive intellect. He dwells impressively on the delight which the rational contemplation of Nature imparts to the student whose higher faculties have been awakened, and who has been taught what to see and how to consider it. "The movements of the clouds, the fall of rain, the flow of brook and river, the changes of the seasons, the succession of calm and storm, do not pass before your eyes now as once they did. While they minister to the joy of life, they speak to you of that all-embracing system of process and law that governs the world." Certainly this capacity for the higher enjoyment of Nature is the happiest result of scientific culture; and were it an invariable or even a very general result, there could never be any question as to the humanizing and liberalizing effect of devotion to scientific studies. If the result in question is not always attained, it is simply because the study of science has not been approached in a right spirit. It is not science that is at fault.

Sir Archibald dwells finally on the need for *accuracy, thoroughness, breadth, and patience* on the part of those who would worthily pursue a scientific career. If his words were duly heeded we should have more of generous co-operation and sympathy among scientific investigators, and less of selfish petty rivalry and clamorous contention in regard to questions of priority. The eminent author has nobly conceived the character and function of the man of science in the present age; and we can not but hope that his sage and earnest counsels to the rising generation of scientific workers will bear abundant fruit in days to come.

FADS AND FRAUDS.

We notice that a magistrate in a Canadian city has inflicted fines, under a "vagrant" act, upon two individuals who had been practicing the alleged art of palmistry. Both of these parties were proved to have told fortunes from the hand for pay; and, though one styled himself "professor" and the other was a "madame" and not a common wayside gypsy, they were both held guilty of common juggling and were punished accordingly. The public prosecutor said that he did not lay any stress on the fact that pay had been taken; he asked for a conviction simply on the ground that fortune-telling was against the law, and he carried his point. The judge observed that similar proceedings might be taken against young ladies who tell fortunes at church and charity bazaars; and the prosecutor admitted that such was very likely the case. These young ladies, he said, would have to look out for themselves.

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We must say that this action on the part of the Canadian authorities strikes us very favorably, and we should be greatly pleased if we could see similar proceedings taken nearer home. It is a lamentable fact that hundreds of persons who ought to know better amuse themselves by lending their countenance to the practitioners of all kinds of silly and dishonest arts, and so far assist them in practicing their frauds upon a more ignorant and helpless class. We are all familiar with the stories which pass current in private circles of the extraordinary revelations and predictions made by ladies and gentlemen who go off in trances and see the past and future unrolled before their upturned eyes with all the distinctness of an actual panorama. But there is one thing which these interesting and highly gifted individuals do not like, and that is to get into the courts, or anywhere where they can be called upon to give a succinct and definite account of their doings and pretensions. They are not ambitious of going into a trance before the magistrate, and giving an exhibition of the powers to which they lay claim in their advertisements, much as that might be expected to help their reputation and their business. For that very reason it would be an excellent thing to bring them where the light of common day could be thrown upon their performances; and, if there is no law under which this could be done, our legislators, who make so many needless laws, might very well pass one, the general effect of which would be to enforce the responsibility of all persons publicly pretending to the possession of any kind of supernatural power. It would tend to cool the faith of even the most benighted dupes to see their favorite seer cutting a foolish figure before a judge who simply wanted to know what it really was for which he charged money. In the Canadian cases both operators, when they got into court, showed a great disposition to minimize their claims to any power of foretelling events by palmistry or otherwise, and so it would be in every similar case. It is one thing to deal with a gullible maiden who wants to know the color of her future husband's hair, and quite another to converse with the officers of the law.

Most of the frauds which have any continued success owe it, in part at least, to an undue faith in the personal integrity of the practitioner. It seems a rude as well as an unkind thing to suppose that So-and-so, whose demeanor is so modest and frank and simple, whose sentiments are so elevated, whose whole personality seems calculated to inspire confidence, is really an outrageous deceiver. In many cases people have said in effect that, if they had to choose between believing a miracle and doubting the veracity of this or that engaging individual, they would believe the miracle. Yet time and again the engaging individual has been proved to be an impostor, and the miracle has fallen to the ground. One of the most remarkable cases of the kind is furnished by the history of the Keeley motor, the absolutely fraudulent character of which has lately been brought to light. Keeley professed to transcend all the known laws of physics and mechanics, and he talked a jargon which all acknowledged to be unintelligible, but the unintelligibility of which was ascribed by his devotees to the fact that he was really working outside of known laws, and could not be expected to translate his ideas into the language of everyday science. In this way what was really an adjunct to the imposture he was practicing was counted as a proof of the truth of his ideas and the reality of his work. Yet now we know that the whole business was a matter of hidden tubes and wires and pulleys and double axles, one concealed within the other, with a

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water motor hidden under the floor. Thus it was that the "ætheric vibrations" and all the other mysterious phenomena were produced. We remember a sermon that was preached some years ago by an earnest divine, who professed to see in the alleged effects produced by Keeley an explanation of the miracle of the casting down of the walls of Jericho. Keeley would take his harmonium and, striking a certain chord, would cause his motor to revolve. In like manner Joshua with his trumpets and pitchers made precisely the kind of noise required to produce the ætheric vibrations necessary to level the walls of the beleaguered city—a wonderful case of the most advanced science coming to the support of a venerable religious tradition! Unfortunately, the walls of Jericho must now be got down in some other way, since it is proved that when Keeley worked the harmonium he also worked the bulb of an air tube placed under his foot in the floor. But Keeley was so honest a man, so devoted to his profound researches, so true a type of the indomitable experimenter, that it was impossible for his friends and admirers to doubt him, even when he spoke of "the sympathetic negative attraction of the triune polar stream."

The lesson of it all is—investigate! *investigate!* INVESTIGATE! The more honest a man is, the more he will court investigation. It is to the credit of humanity perhaps that so much reliance is placed upon estimates of personal character in these extraordinary cases; but where belief is demanded for anything that is absolutely beyond comprehension, character should be put out of court altogether, and the one question should be, What are the facts? In the Keeley case, unfortunately, men of science as well as others were among the deluded. They should have suspected fraud; at least they should have insisted on making such investigations as a suspicion of fraud would have suggested; and, if they were not allowed to make them, they should have refused all countenance to the business. As it is, many ignorant persons who lost money through Keeley's imposture will very properly cast blame on the presumed competent mechanics and physicists who went through the form of examining Keeley's apparatus and afterward spoke, however guardedly, of his extraordinary results. As an object lesson in regard to the need for uncompromising skepticism when facts which can not be accounted for on understood principles are presented for acceptance, the history of the Keeley motor should not soon be forgotten.

Scientific Literature.

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SPECIAL BOOKS.

Professor *Bailey* shows, in his book on the *Evolution of Our Native Fruits*,^[43] that the value of the native American species has not yet begun to be adequately estimated, and his narrative carries the conviction that the possibilities to be realized from their development are totally undreamed of. De Candolle made the astounding assertion, in his book on *The Origin of Cultivated Plants*, that the United States only yields as nutritious plants worth cultivating the Jerusalem artichoke and the gourds. "They had a few bulbs and edible berries, but have not tried to cultivate them, having early received the maize, which was worth far more." "And yet," Professor Bailey answers, "the American grapes have given rise to eight hundred domestic varieties, the American plums to more than two hundred, the raspberries to three hundred, and various other native fruits have a large progeny." Three motives, the author says, run through his book: An attempt to expound the progress of evolution in objects which are familiar and have not yet been greatly modified by man; an effort to make a simple historical record from unexplored fields; and a desire to suggest the treasures of experience and narrative which are a part of the development of agriculture. The studies of which the book is a fruit were begun more than ten years ago, and were pursued with original sources where they were accessible, and at the cost of much labor and travel. The story begins with the grapes. The cultivation of native grapes, which are singularly abundant and various in the wild condition, began after several attempts on the large and on the small scale to make foreign grapes profitable had failed. Nicholas Longworth, of Cincinnati, who did more than any other one man to promote it, sought for wine grapes. After several varieties had been tried with more or less success, the Catawba and the Concord were introduced, and the cultivation was established and became important, but no longer with wine-making as its chief object. Now we have a large variety of grapes—characteristic, finely flavored, and adapted to numerous uses in wines and desserts. Plums are mentioned in the early records nearly as frequently as grapes. There are five native types from which diverse varieties have arisen, the greater part of them of fortuitous origin. The native cherries have not yet been very hopeful of promise, except the dwarf species, which seem "destined to play an important part in the evolution of American fruit." Five types of native apples are known, from which a number of named and worthy varieties have arisen, by Nature's propagation, not man's; and the author anticipates great benefits to be derived from the very gradual and undemonstrative insinuation of native blood into the domestic sorts. The story of the cultivation of the raspberries, blackberries, dewberries, strawberries, gooseberries, currants, and mulberries tells of much patience and skill applied to the production of results in the benefits of which all may share, and which have undoubtedly added to the sum of human well-being. There remain still many fruits, the improvement of which has hardly begun, and which offer a promising field for experiment—the persimmon, pawpaw, whortleberry, buffalo berry, barberry, and nuts. The whole history of the improvement of American fruit is interpreted by Professor Bailey as showing that in nearly every case the amelioration has come from the force of circumstances, and not from the choice or design of man, principally because foreign species did not do well and something adapted to American conditions had to be found. Yet much

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skill has been shown in recognizing the good qualities of the native species, and in giving them conditions favorable to improvement. For the future the author believes that the best results at the amelioration of any species are to be expected by working with the highly improved forms rather than with the original wild stock. We need, he says, a greater range of variation, more divergent and widely unlike varieties, and more incidental or minor strains of the most popular and cosmopolitan sorts. Professor Bailey finds the greatest satisfaction in his book in the record of the men who have been instrumental in introducing the improved fruits. No men have been greater benefactors to our country than these, who have done the equivalent of making two blades of grass grow where only one grew before, and have added to the healthful sum of pleasure and content.

As Professor Darwin truly says, a mathematical argument is, after all, only organized common sense; but, unfortunately, it is usually in such a highly organized form as to be beyond the intelligence of the average reader. In the present volume,^[44] however, the author has wonderfully simplified a most intricate and difficult mathematical subject, and really seems to give some justification for the above generalization.

The first chapter of *The Tides* is devoted to defining them and describing methods of observation and study. The curious tidal movements in lakes, called *seiches*, which were first systematically studied by Professor Forel on the Lake of Geneva, are taken up in the second chapter; an account of Forel's work is given, and the statement made that similar researches are now under way on other lakes, notably that of Mr. Denison on Lake Huron in this country. Tides in rivers, including an account of the curious tidal phenomenon known as a "bore," are next described, the laws governing their variation and the ways in which they differ from the tides of the open sea being carefully laid down. A brief historical chapter, containing some curious extracts from Chinese and Icelandic literature, is rather instructive anthropologically than tidally. The three following sections are taken up by a study of tide generating and modifying forces, and include an interesting account of the experiments made some years ago by Dr. Darwin and his brother, in an effort to measure tidal forces by means of the bifilar pendulum, which is now such an important agent in seismological investigation. Chapters IX and X give an account of the equilibrium, and the dynamical theories of the tide-generating forces, and are chiefly accounts of the devices by which mathematicians have endeavored to bring artificial order out of the actual chaos. The great complexity of this portion of the subject; the variety of forces operating to produce the tides, the sun, the moon, the earth's rotation, etc.; and the number of retarding and confusing elements, friction, interposed land masses, river currents, air movements, depth of water, etc., render these theories practically valueless for use in tidal calculations.

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In the following section Dr. Draper shows how, by means of Lord Kelvin's "harmonic analysis," which separates the tide-generating forces of each kind into a number of ideal components, results of practical value are obtained. In Chapter XIII a very ingenious instrument for tide prediction which has been in use for some time by the Indian Government is described. The recording part of the machine is simply a paper-wound drum, on which a pencil point makes a graphic record. When the tides of a given port are desired, it is only necessary to set the instrument according to the tidal components, obtained by harmonic analysis and the time chosen for the beginning of the tide table, and then start it at the proper moment. It takes about four hours to run off the tidal curve for a year. This curve is then measured, and the year's tide table readily made out. Dr. Darwin informs us that a very similar instrument is now in course of construction for the United States Government. The remainder of the work consists of a more detailed discussion of the various disturbing influences which interfere with the simplicity of tidal movements—displacement of the earth's axis, earthquakes, etc, a long discussion of tidal friction, a study of the laws of rotating liquid masses, the nebular hypothesis, and finally a chapter on Saturn's rings. The text in many places will be found difficult to understand by the general reader, despite the author's efforts to fully and simply explain every point, and it seems questionable whether a thorough discussion of tidal phenomena can be made simple enough for the layman's comprehension. The volume can not be read by any one, however, without instruction, and is much the best general discussion of tidal phenomena which we have seen.

GENERAL NOTICES.

The *Elementary Zoölogy* of Frank E. Beddard^[45] contains an account of a few types selected from the chief groups of the animal kingdom, followed and accompanied by a consideration of some of the more general conclusions of biology. A type system has to be used, but the author has endeavored to obviate the great fault of that method—the liability of the students conceiving that the characters of the species selected for description are distinctive of a wider assemblage of forms—by emphasizing here and there the differences between allied groups. The question arises whether to begin with the higher forms and go down to the lower, which some authorities believe to be the course easier of comprehension by the student, or to follow the inverse method. The author prefers to begin with the lower forms and gradually work to the higher as the course having the undoubted advantage of presenting the facts in a logical sequence. He accordingly begins with the amoeba and proceeds upward. The treatment is simple and lucid. Novelty has not been sought in the illustrations, though there are several new ones, but selections have been made from the best already drawn.

An Introductory Logic^[46] grew out of the lectures of the author, Prof. J. E. Creighton, to undergraduate classes in Cornell University; is intended primarily as a text-book for students, and aims at being both practical and theoretical. The broad view is taken in the definition of the subject that logic is the science of thought, or the science that investigates the process of thinking; and the author expresses himself convinced that, in spite of some difficulties, formal logic is one of the most valuable instruments in modern education for promoting clear thinking and for developing critical habits of mind. To doubters of the advisability of attempting to include a theory of thought or a philosophy of mind in an elementary course in logic, Professor Creighton replies that psychology having differentiated itself from philosophy and become a "natural" science, no longer undertakes to describe all that the mind is and does. "It belongs to logic to investigate intelligence as a knowing function, just as it is the task of ethics to deal with the practical or active mental faculties." Logic must first be a science before it can become an art, but it can not be regarded as an art in the sense that it furnishes a definite set of rules for thinking correctly. What it can do is to show the method by which new truths have been discovered and the general conditions that must always be fulfilled in reasoning correctly. The treatment in the text follows the usual order, except that the author, keeping clear of artificial diction, writes in talking English that is easy to be comprehended.

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There are no more vital problems in the evolution of society than those connected with the point of view, the outlook, of the great masses of the "working people." These people form the backbone, the potential energy of society; an acquaintance with their views of ethics and life, and manner of living, is of the utmost importance, not only *per se*, but especially because of the efficient direction which such a knowledge can give the attempts at improving these latter, and through them society at large. Mr. Walter Wyckoff has, apparently actuated by some such view as this, in combination perhaps with a desire for a novel experience, made a two years' trip across the continent, living chiefly among the lowest and most improvident class of manual laborers; making his own living by their methods, and, by means of the close contact, studying them from a vantage point of unusual value. The account of this expedition^[47] is, as it could not fail to be, no matter who the traveler might have been, of great interest and value. But in Mr. Wyckoff's hands the story has an added attraction through the literary ability of the author. There is much material of practical scientific value in the volume; it should prove especially suggestive and useful to some of our charity organization workers who apparently find it so difficult to govern their work by reason rather than emotion. There are one or two rather unpleasant lapses, the most marked of which advertises in a Chicago police station Mr. Wyckoff's great linguistic attainments, but the work is generally free from this sort of weakness, and is on the whole very well worth reading for instruction as well as entertainment.

The *Manual of Determinative Mineralogy* of Professors George J. Brush and Samuel L. Penfield^[48] is intended primarily to be used in the identification of minerals, and that purpose has been kept prominently in view. The present edition is a complete revision of Professor Brush's original work, the value of which and the estimation in which it is held by its constituency are attested by the fact that fourteen editions of it have been issued since it first appeared in 1874. A revision of the parts devoted to blowpipe analysis and the chemical reactions of the elements was published in 1896. To the present edition a chapter is added on the physical properties of minerals, devoted chiefly to crystallography, in which the endeavor has been made to present the subject as simply as possible. Importance has been attached to the description of those forms which are of most frequent occurrence, and the examples chosen to illustrate the different systems represent, as a rule, the simple forms that prevail in specimens of common minerals, while rare and complex forms are treated very briefly. The introduction of a large number of species since 1874 has made a complete rearrangement necessary in the analytical tables; and they have been so developed that tests for characteristic chemical constituents furnish the chief means of identification. Stress is laid upon the importance of determining the chemical constituents as a factor in securing accuracy in identification.

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Demonstrator G. S. Newth opens his *Manual of Chemical Analysis*^[49] with a protest against the thought of "doing" analysis without learning more than the minimum amount of chemistry, and against teaching and practicing it in such a manner as to degrade it to the level "of a purely mechanical and often unintelligible series of rule-of-thumb operations." He says he has done his best to make it "as little of a cram book as possible," and has endeavored "to teach analytical chemistry as well as analysis"—that is, the theoretical as well as the practical side of the subject. He begins with emphasizing the importance of the student making himself *practically* familiar with certain simple operations he will have to perform constantly, and gives clear, concise definitions of such terms as filtration, solution, evaporation, fusion, precipitation, ignition, etc., which relate to those operations. He condemns slovenly formulas and mechanical notes, but commends real notes of the student's own observations. In his treatment he excludes merely descriptive details that have no bearing on analysis; and in quantitative analysis, prefers describing fully a few typical methods and processes to covering much ground slightly.

The Ingersoll Lectureship at Harvard University is constituted on a legacy by Miss Caroline H. Ingersoll, carrying out the wishes of her father, George G. Ingersoll, for the foundation of an annual lectureship on the "Immortality of Man," to which no conditions as to doctrine or method of treatment are attached. The purpose of the lectures, or perhaps their operation, as defined by Prof. William James, is that out of the series may emerge a collective literature worthy of the theme. Professor James took as the special subject of his lecture^[50] the answer to two objections to the doctrine of immortality: first, the absolute dependence of our spiritual life, as we know it

here, on the brain; and the second relating to "the incredible and intolerable number of beings which, with our modern imagination, we must believe to be immortal, if immortality be true." To the former objection the author replies that thought is not a productive but a permissive or transmissive function of the brain; when the brain decays, the sphere of being that supplied the consciousness is still intact, and the stream still goes on; to the second, that spiritual being is not as material being, that each new mind brings "its own edition of the universe of space" along with it, that there is no crowding or interference, and that the supply of individual life in the universe can never possibly exceed the demand.

The first number of *In Lantern Land*, a monthly journal "devoted to literature, the fine arts, the play, with some discussion of passing events," Charles Dexter Allen and William Newnham Carleton, editors, gives promise of a literary journal of elevated tone. It holds its aim to be unprejudiced and independent. (Published at Hartford, Conn., by Charles Dexter Allen, for one dollar a year.)

Mr. Henry Carr Pearson presents in his *Greek Prose Composition* (American Book Company, 90 cents) results of his own experience in the class room. The aim of the book is to combine study of the essentials of Greek syntax with practice in translating connected English into Attic Greek, and to afford convenient practice in writing Greek at sight. The work is in three parts: Part I, containing, in graded lessons, the principal points of Greek syntax, designed for use at the beginning of the second year's study of Greek; Part II, short simple English sentences modeled after sentences in Xenophon's *Anabasis*, for daily use in connection with reading of the text; and Part III, connected English prose, graded, also based on the *Anabasis*. Review lessons are introduced, and a Greek-English vocabulary is provided.

Mr. James W. Crook, in the introduction to his history of the development of *German Wage Theories* (Columbia University Studies in History, Economics, and Public Law), remarks upon the slowness with which political economy, and particularly the study of questions concerning wages, has advanced in Germany. Hardly any original work on wages is to be found there for half a century after the publication of Adam Smith's *Wealth of Nations*, although numerous text-books bearing upon the subject were issued—all for the most part only summarizing or slightly modifying the reasonings and conclusions of the English master. The conditions of economic life in the two countries were different, and the "industrial revolution was slow in developing on the Continent, and in Germany the old industrial order with its restrictions and conservative methods prevailed long after England had replaced the old with the new." These differences between the two countries may adequately account for the great disparity in theoretic development. And Germany is still largely dependent upon other countries in its discussions. In the present work, the chief object being to discover progress of thought on the subject, chronology had to be sacrificed, in some instances, to a logical treatment. Those writers are grouped who appear to show the largest number of points of contact, and this leads to placing all the German writers treated in two groups, in one of which a real unity of method and interest prevails, and Hermann is the most important center, while the other group includes von Thünen, Karl Marx, and Schulze-Gaevernitz, authors who do not belong together in the sense that the others do.

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Among the articles in the *Columbia University Bulletin* for June, 1898, are those on the Department of History, the Preparatory Schools (by G. R. Carpenter), Columbia Non-Graduates (H. G. Paine), the Teaching of Anatomy (by George S. Huntington), and the second of Mr. H. A. Cushing's historical papers on King's College in the American Revolution.

The report of Filibert Noth, special agent of the Division of Forestry, on *Forestry Conditions and Interests of Wisconsin*, and the *Third Annual Report of the Chief Fire Warden of Minnesota*, C. C. Andrews, furnish many facts and suggestions of value to persons interested in the maintenance and protection of our forests.

D. Appleton and Company publish as one of their Home Reading Books *The Story of Rob Roy*, by Sir Walter Scott, condensed for home and school reading by Edith D. Harris. The editor of the series, Dr. W. T. Harris, furnishes a preface, pointing out the essential qualities of Scott's works on which their fame rests, and analyzing the features of Scottish and English life of the age to which they relate and which give these stories of the border their interest and charm. In explanation of the plan and reason of the present condensation, he says that "it has been found possible to condense the *Waverley* novels by omitting all lengthy descriptions of scenery, historical disquisitions on the times, and a few passages of dialogue and monologue that do not contribute directly to the progress of the story, or throw light upon the character of the persons who enter upon the scene. It is believed that by this method the interest is preserved intact, and that after a year's interval the story in its unabridged form may be read with as lively an interest as the youth will feel in reading this version." Price, 60 cents.

A paper, *Indices Ponderaux de la Crane* (Weight Indexes of the Brain), in the Bulletin of the Anthropological Society of Paris, comprises the results of a study of the weight and capacity of the brain, the weight of the mandible, and the cranio-mandibular and cranio-cerebral indices, etc., made upon sixty-four heads of animals by George Grant McCurdy, of New Haven, with the collaboration of M. Nicolas Mohyliansky.

The pamphlet embodying the *Proceedings of the Tenth Annual Session of the Association of American Anatomists*, held at Cornell University in December, 1897, contains a portrait and notice, with bibliography of the late Dr. Harrison Allen, the reports of the majority and the minority of the committee on anatomical nomenclature, and seventeen papers contributed by members of the association.

The *University Geological Survey of Kansas* is conducted under the authority of the Board of Regents of the State University, and has issued already several large and elegant volumes recording the operations and results of its work. The fourth volume, now before us, embraces the paleontology of the Upper Cretaceous, and is by *Samuel W. Williston*, paleontologist. Kansas is famous for its fossils, no equal area in the United States, perhaps, presenting such varied and remarkable records of this kind. Yet, while the State has furnished much of interest to the sciences of geology and paleontology, the published accounts in these departments are confined to scattered and abstruse papers accessible only to the specialist. The present publication is an effort to put this knowledge, so far as the particular formation to which it relates is concerned, within the reach of students. Professor Williston has been engaged for twelve years in the study of the geology and paleontology of the State, having spent more than three years in field exploration, and has been eight years collecting material for his book, enjoying the advantage of access to the very important collection of the university. Much of the information is here published for the first time. The fossils of the western part of the State only are described in it, for the sole reason that more preparatory work has been done on them in the university in recent years; but other departments are in preparation and will appear in due course. The fossils described are birds, dinosaurs, crocodiles, mosasaurs, turtles, microscopic organizations, and invertebrates, all of the Upper Cretaceous.

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In a paper on *The Relations of the People of the United States to the English and the Germans*, read before the Thursday Club of Chicago, Mr. *William Vocke* undertakes a defense of the Germans against a supposition that they are hostile to the United States. This is right, if the Germans need defense, which we doubt; but to give his thesis the shape of an attack on England, as is done in the paper, is unnecessary.

The account of the investigations conducted by Dr. *D. N. Bergey* under the supervision of Drs. J. S. Billings and S. Weir Mitchell, on the *Influence upon the Vital Resistance of Animals to the Micro-organisms of Disease, brought about by a Long Sojourn in Impure Atmosphere*, already referred to in the *Monthly*, is published under the Hodgkins Fund in the Smithsonian Miscellaneous Contributions.

The *Report of the United States National Museum* which we are called upon to notice is for the year 1895, and bears the signature of *G. Brown Goode*. It embraces accounts of the origin and development of the museum, its organization and scope, and its work in public education; reviews of the special topics in its operations for the year; synopses of the scientific work in various departments; the administrative reports; appendixes relating to accessions to the collections, lectures, meetings, etc.; and a number of special papers of great value and interest, including an account of the Kwakiutl Indians, by Franz Boas; The Graphic Art of the Eskimos, by W. J. Hoffman; The Geology and Natural History of Lower California, by G. P. Merrill; The Tongues of Birds, by F. A. Lucas; The Ontonagon Copper Boulder in the United States Museum, by Charles Moore; The Antiquity of the Red Race in America, by Thomas Nilsen; and accounts of the Mineralogical Collections in the Museum, by Wirt Tassin, and of the Taxidermical Methods in the Leyden Museum, Holland, by Dr. Shufeldt.

The Dawn of the Twentieth Century is a poem, described by the author, *Charles P. Whaley*, as his first sermon, dedicated to rationalism. He describes himself as having recovered from "a severe attack of orthodoxy," which deprived him for the time of the power of logical reason, and to have at last discerned a theology, "founded upon absolute, demonstrable scientific facts," which is to prevail in the next century. His poem presents his view of that theology.

In the September number of the *Quarterly Review*, *The New World*, an article by Prof. *Otto Pfeleiderer* on Evolution and Theology, defines the task of Ecclesiastical Protestantism after having abandoned the ethical ideals of mediæval Christianity, as being "for a still wider development, to strike off the dogmatic fetters of ecclesiastical criticism, and to clothe its religious principle in new forms of thought, which shall render for our age the same service that the Greek and Roman dogmas rendered for the earlier time." In an article on Social and Individual Evolution, Mr. *Henry Jones* maintains that the social tendencies of the present day point to a limitation of individual independence and enterprise.

A contribution to the anthropology of the Jesup North Pacific Expedition, *Facial Paintings of the Indians of Northern British Columbia*, by *Franz Boas*, forms the first part of Volume II of the *Memoirs of the American Museum of Natural History*. The Jesup expedition has been organized under the patronage of Mr. Morris K. Jesup, president of the museum, and under the direction of that institution, to study what relations may exist or may have existed between the natives of the northwest coasts of America and the peoples of the neighboring Asiatic coasts. The general likeness, in the midst of their special minor diversities, of all the Indians of the American continent points to an ultimately common origin for them, while the differences indicate that this may not have been precisely identical in time and place, and seem to have required a very long time for their development and establishment. The purpose of the expedition is to collect all the information that can be obtained by its method of exploration contributing to this end. The present contribution embodies the fruits of a study of the arts, as applied to facial decoration, of the Thompson River Indians, the Chilcotin, the Bella Coola, the Kakiutl, and the Nootka. This art is almost exclusively based on animal motives, is highly conventionalized, and has the unique peculiarity of seeking to fit the whole figure of the animal to the surface on which it is applied; whence it presents some curious effects. In this effort to illustrate the principles of its conventionalism Dr. Boas has selected as the most difficult and complicated surface the human

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face, of which he gives in six plates eighty-eight figures of as many different styles of decoration.

PUBLICATIONS RECEIVED.

Agricultural Experiment Stations. Bulletins and Reports. Cornell University: No. 154. Tables for Computing Rations for Farm Animals. By J. L. Stone. Pp. 20; No. 155. The San José Scale. By H. P. Gould. Pp. 12; No. 156. Potato Culture. By I. P. Roberts and L. A. Clinton. Pp. 12; No. 157. The Grapevine Flea Beetle. By M. V. Slingerland. Pp. 24; No. 158. Bacteria in Cheese Curd. By V. A. Moore and A. R. Ward. Pp. 20. with plate; No. 159. Report on Progress of Work. Pp. 32.—Hatch Station of Massachusetts Agricultural College: No. 56. Concentrated Feed Stuffs. Pp. 24.—New Jersey: No. 132. Fertilizer Analyses. Pp. 61.—Ohio: Seventeenth Annual Report for 1898. Pp. 48.—Purdue University: No. 73. Tests of Strawberries, Raspberries, Blackberries, and Grapes. Pp. 16; No. 74. A Native White Bedding Plant (Starry Grasswort). By J. C. Arthur. Pp. 12.—United States Department of Agriculture: No. 16. The Hessian Fly in the United States. By Herbert Osborn. Pp. 60, with plates; Miscellaneous Results of the Division of Entomology. Pp. 102.—University of Wyoming: No. 39. Alkali Studies. By E. E. Blosson and B. C. Buffum. Pp. 24.

Allen, Alfred H., and Leffmann, Henry. Commercial Organic Analysis. Third edition. Revised. Vol. II, Part I. Philadelphia: P. Blakiston, Sons & Co. Pp. 387. \$3.50.

American, The, Kitchen Magazine. A Domestic Science Monthly, January, 1899. The Home Science Company, Boston, Mass. Monthly. 10 cents. \$1 a year.

Bailey, L. H., Editor. The Principles of Agriculture. New York: The Macmillan Company. Pp. 300. \$1.25.

Bardeen, C. W. Commissioner Hume. A Story of the New York Schools. Syracuse, N. Y.: C. W. Bardeen. Pp. 210. \$1.25.

Bates, Frank Greene. Rhode Island and the Formation of the Union. New York: Columbia University (Studies in History, etc.). The Macmillan Company. Pp. 220.

Brooks, William Keith. The Foundations of Zoölogy. New York: The Macmillan Company. Pp. 339. \$2.50.

Bulletins, Reports, etc. Atlanta University: Some Efforts of American Negroes for their own Social Betterment (Report of the Third Atlanta Conference). Pp. 66.—Bruner, Lawrence, University of Nebraska: Some Notes on Nebraska Birds. Pp. 178.—City of Chicago: Report of the Educational Commission. Pp. 248.—Connecticut: Fourteenth Annual Report of the State Bureau of Labor Statistics. Pp. 234.—Harvard Astrophysical Conference, August, 1898. By M. B. Snyder. Pp. 33.—Harvard College Astronomical Observatory: Annual Report of the Director to September 30, 1898. By E. C. Pickering. Pp. 14.—Iowa State University: Bulletin from the Laboratories of Natural History, Vol. IV, No. 4. Pp. 96, with plates.—Jewish Training School of Chicago: Ninth Annual Report. Pp. 45.—Michigan: Thirtieth Annual Report of Registry and Return of Births, Marriages, and Deaths for 1896. By C. L. Wilbur. Pp. 188.—Model, the Gas and Gasoline Engine. Garrett Works, Indiana. Pp. 22.—New York State Museum: A Guide to the Geological Collections, By F. J. H. Merrill. Pp. 156, with plates.—Society of American Authors: Monthly, January, 1899. Pp. 12.—Tokio, Japan, Imperial University Calendar. Pp. 250, with map.—United States Commissioner of Education: Report for 1896-'97, Vol. II. Pp. 1260.—United States Fish Commission Bulletin, Vol. XVII, 1897. George M. Bowers, Commissioner. Pp. 436.

Campbell, D. H. Lectures on the Evolution of Plants. New York: The Macmillan Company. Pp. 319. \$1.25.

Clinical Excerpts. Vol. I, No. 10. Pp. 16.

Coming Age, The. A Magazine of Constructive Thought. B. O. Flower and Mrs. C. K. Reifsinder, Editors. Vol. I, No. 1, January. 1899. Boston: The Coming Age Company. Pp. 122. 20 cents. \$2 a year.

Dabney, Charles W., Jr. University of Tennessee. The Old College and the New. Pp. 16.—A National Department of Science. Pp. 13.

Elliott, A. G., Editor. Gas and Petroleum Engines. Translated and adapted from the French of Henry de Graffigny. New York: The Macmillan Company. 75 cents.

Farrington, E. H., and Wall, F. W. Testing Milk and its Products. Madison, Wis.: The Mendota Book Company. Pp. 256, \$1. Pp. 140, 75 cents.

Haeckel, Ernst. The Last Link in our Present Knowledge of the Descent of Man. New York: The Macmillan Company. Pp. 156. \$1.

Huntington, Harwood. The Yearbook for Colorists and Dyers. Vol. I. New York: The Author. Pp. 309.—Some Notes on Chemical Jurisprudence. 260 West Broadway, New York. Pp. 24. 85 cents. [Pg 712]

Index, The. Devoted to the Latest News and Gossip in the Field of Art and Letters. G. B. Rogers, Editor. Vol. I, No. 10. Cleveland and New York: The Hellman-Taylor Company. 50 cents a year.

Lee, Sidney, Editor. Dictionary of National Biography. Vol. LVII. Tom to Tytler. New York: The Macmillan Company. Pp. 461. \$3.25.

- Luquer, L. M. Minerals in Rock Sections. The Practical Methods of Identifying Minerals in Rock Sections with the Microscope. New York: D. Van Nostrand Company. Pp. 117.
- Marr, J. E. The Principles of Stratigraphical Geology. New York: The Macmillan Company. Pp. 304. \$1.60.
- Martin, H. Newell. The Human Body. Fifth edition. Revised by G. W. Fitz. New York: Henry Holt & Co. Pp. 408. \$1.20.
- Mervan, Rencelof Ermagine. What is This? Copyrighted by G. Washington Price. Pp. 272.
- Morehouse, G. W. The Wilderness of Worlds. The Evolution of Matter from Nebula to Man and Return. New York: Peter Eckler. Pp. 246.
- Nichols, E. L., and Franklin, W. S. The Elements of Physics, Vol. I. Mechanics and Heat. New edition, revised, with additions. New York: The Macmillan Company. Pp. 219. \$1.50.
- Ober, Frederick A. Puerto Rico and its Resources. New York: D. Appleton and Company. Pp. 282, with map.
- Ratzel, Prof. Friedrich. The History of Mankind. By A. J. Butler. Introduction by E. B. Tyler. Vol. III. New York: The Macmillan Company. Pp. 599, with maps. \$4.
- Reprints. Andrews, General C. C. Utilization of Our Waste Lands for Forestry Purposes. Pp. 10.—Bailey, Prof. E. H. S., Lawrence, Kan. The Proof of the Law of Similia (Homœopathic) from the Electro-Chemico-Physiological Standpoint. Pp. 8.—Bangs, L. Bolton, New York. Illustrative Cases of Prostatitis. Pp. 24.—De Courcy, J. Osborne, East St. Louis, Ill. Diseases of the Alimentary Canal, Ulcers, Malignant Sore Throat. Pp. 24.—Gilbert, G. K., Washington. Recent Earth Movements in the Great Lakes Region. Pp. 50.—Kakels, Sara W. Pregnancy in Women with Uterus Duplex.—Mayfield, R. N., New York. Catheters and Cystitis. Pp. 3.—Rotch, A. Lawrence. The Exploration of the Free Air by Means of Kites at Blue Hill Observatory, Massachusetts. Pp. 10.
- Sladen, Douglas, Editor. Who's Who? 1899. An Annual Biographical Dictionary. Fifty-first year. New York: The Macmillan Company. Pp. 1014. \$1.75.
- Smithsonian Institution. Adler, Cyrus, and Casanowicz, I. M. Exhibit of Biblical Antiquities at the Cotton States Exposition, Atlanta, Ga., 1895. Pp. 87, with plates.—Clark, Hubert L. The Feather Tracts of North American Grouse and Quail. Pp. 12, with plates.—Langley, S. P. Report of the Secretary for the Year ending June 30, 1898. Pp. 89.
- Starr, Frederick; American Indians. Boston: D. C. Heath & Co. Pp. 227. 45 cents.
- Stewart, Freeman. Shall we Grow the Sugar we Consume? Swarthmore, Pa.: R. S. Dare. 25 cents.
- Thompson, Sylvanus P. Michael Faraday: His Life and Work. New York: The Macmillan Company. Pp. 308. \$1.25.
- Whitaker, Herbert C. Elements of Trigonometry, with Tables. Philadelphia: Eldridge & Brother. Pp. 196.
- Wilson, L. L. W. Nature Study in Elementary Schools. First Reader. New York: The Macmillan Company. Pp. 253. 35 cents.

Fragments of Science.

Pre-Columbian Musical Instruments in America.—In a recent article in the Popular Science Monthly (November, 1898), entitled Was Middle America Peopled from Asia? I insisted that if there had been any invasion, peaceful or otherwise, sufficient to have affected even in the slightest degree the arts, customs, and religious beliefs of middle America, then, associated with these influences, we should find traces of Asiatic utensils, implements, structures, such as sandals, weapons, pottery, wheels, plows, roofing tiles, etc.; in other words, just those objects most intimately associated with man. I especially considered the absence of stringed musical instruments and coincided with Dr. Otis T. Mason in the belief that there was no evidence of a pre-Columbian stringed musical device. This question has been variously discussed and the following references bear on the subject: A short note in the American Antiquarian for January, 1897, by Dr. D. G. Brinton, entitled Native American Stringed Musical Instruments. The author frankly admits, however, that the cases cited may all have been borrowed from the whites or negroes. Mr. M. H. Saville in the American Anthropologist for August, 1897, described A Primitive Maya Musical Instrument, though he makes no pronounced statement of its pre-Columbian origin. Dr. Mason, in the American Anthropologist for November, 1897, discusses the question under the title Geographical Distribution of the Musical Bow, and in this paper says, "I have come to the conclusion that stringed musical instruments were not known to any of the aborigines of the western hemisphere before Columbus." In my paper I insisted that "had this simple musical device been known anciently in this country, it would have spread so widely that its pre-Columbian use would have been beyond any contention." Mr. Saville finally, in the



FIG. 1.



FIG. 2.

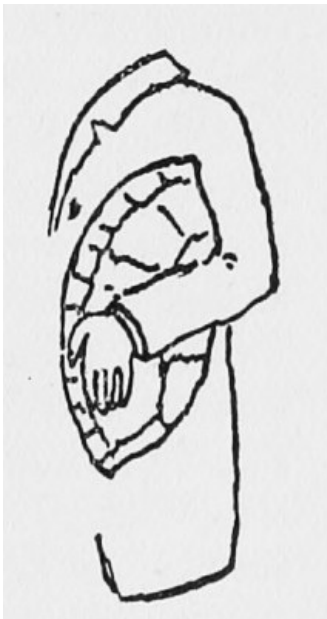


FIG. 3.

American Anthropologist for September, 1898, shows apparently the existence of a pre-Columbian stringed musical device in a paper entitled *The Musical Bow in Ancient Mexico*, and presents his proof in the form of a reproduction from an ancient Mexican codex of an orchestra of six performers. One of the figures, according to Mr. Saville's interpretation, is holding a musical bow in his left hand while with his right hand he is striking the cord with a forked stick. Claiming no skill in the interpretation of these quaint and concentrated Jack-of-heart figures, I readily yielded to the authority of Saville in this matter, and so acknowledged in a footnote in my paper which I was enabled to insert after the pages were made up. Within a few days I have received a letter from Mrs. Zelia Nuttall, the eminent American paleographer, to whom we are indebted for the most profound researches in connection with these ancient codices. In this letter Mrs. Nuttall refers to Sahagun's great manuscript, wherein she says: "The native musical instruments are repeatedly enumerated. The turtle's shell figures among them, *but there is no trace of a stringed musical instrument ever having been known or employed in ancient Mexico.*" (The Italics are hers.) Mrs. Nuttall then says that the object held under the arm of the musician which has been recognized as a musical bow is undoubtedly a turtle's shell. In support of this view she sends me a tracing of the figure from the original manuscript which is now in Vienna, in which the entire object under the arm of the player as well as the forked stick is

colored blue (Fig. 1). A photograph is also inclosed from another ancient Mexican manuscript in course of publication by Mrs. Nuttall. In this (Fig. 2) the player has the turtle's shell and is pounding on it with a pronged stick, horn, or branch, while in the other hand he holds a rattle and at the same time sings, the notes being graphically portrayed as they come from his mouth. It will be observed that it is the plastron or ventral surface that he is striking, as shown by the notches in its forward and hinder edges, though the plates are incorrectly drawn. In the figure given by Mr. Saville the player is holding the turtle's shell in precisely that position that would enable him to strike the plastron. Even in Mr. Saville's figure the marginal plates of the shell are plainly indicated. By holding the figure face downward the shell is thrown in a normal position with the back uppermost, and what was mistaken for the string of the instrument is the outline of the back of the turtle correctly delineated. With the above figures I give the outline of the left arm and body of a friend who posed for me while holding a large South American turtle under his arm. I have drawn the plates of the carapace to more clearly indicate the position of the turtle's shell. In the original codex, as before remarked, this portion is colored blue. In this attitude the flat plastron forms the drumhead, so to speak, the carapace acting as a resonator. I am sure that Mr. Saville will agree with me that Mrs. Nuttall's attribution is the correct one.

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EDWARD S. MORSE.

Rebreathed Air as a Poison.—The following extracts are taken from an article by Dr. John Hartley, in the *Lancet*: "The fresh-air treatment of consumption" appears to be made up of three essential factors: (1) the discontinuance of the supply of bacilli from without; (2) the supply of an abundance of nutritive material to the tissues; and (3) the supply of an abundance of fresh air uncontaminated by the products of respiration. This seems to mean that the tissues, if not too enfeebled, may be trusted to deal with the bacilli already present if their metabolism is kept going at high pressure. Fresh air is now the "official" remedy in the treatment of tubercle. Why is it so ignored in the case of other diseases? Has the pneumonic or bronchitic no need of special ventilation because his microbe is of a different breed? The air was intended not only for

phthical patients or patients suffering from pneumonia but for *all*—diseased and healthy alike—and it is still the natural medium in which the poisonous products of tissue metabolism excreted by the lungs are further broken down and rendered harmless. Dr. A. Ransome has done great service not only by his onslaught on "air sewage" but also by his coinage of the term; for a thoroughly good opprobrious epithet resembles a good wall-poster in its power of arresting and enchainning the attention of the many. It was long ago pointed out that certain constituents of expired air are intensely powerful nerve poisons. These considerations should surely make us look on rebreathed air and sewer gas, not as mere carriers of accidental poisons, such as influenza and pneumonia and the like, but as *poisons per se*, and I wish to be allowed to record a few very imperfect observations made by myself during some years past chiefly on the subject of rebreathed air, with certain inferences which I think tend, however feebly and imperfectly, to show that the poisons we expire have *per se* very definite effects on tissue metabolism and need not a mere perfunctory admixture with fresh air but very large and very continuous dilution before they are rendered innocuous—that is to say, innocuous to *all*; for while some persons appear to be almost immune, others seem intensely susceptible. The first observation I will allude to was made in the autumn of 1896, in cool weather. I had to take a long night journey by rail after a long and hard day's work. The train was full and the compartment I entered was close; so, as I was tired and fagged, I sat in the corridor by an open window, well rugged up, throughout the journey. The compartment was completely shut off from the corridor by a glass door and windows, through which I could freely inspect its occupants. Two remarkably fresh-complexioned, wholesome-looking young fellows got into the compartment at York. They formed a remarkable contrast to the pallid and fagged-looking travelers already there. The windows and ventilators were carefully closed, and the newcomers, with the rest, settled off to sleep and slept soundly for nearly four hours, with the exception of a few minutes' interval at Grantham. When aroused on nearing London they, like the other occupants of the compartment, were haggard and leaden-hued, their fresh color was entirely gone, and they looked and moved as if exhausted. I examined my own face in the lavatory mirror at the beginning and end of the journey and could see but little alteration in my color; if anything, it was rather improved by the end of the journey. The second case occurred early in 1897. I was asked to see a woman, aged about forty-eight years, who had been treated in a neighboring town for many weeks for bronchitis and asthma following influenza. She had relapsed about a week when I first saw her. She was then sitting up in bed; her face was leaden-colored, her skin was clammy and sweating, with a feeble, quick pulse, and the heart sounds were indistinguishable owing to wheezing; there was some crepitation at the bases. The temperature was about 101° F. The weather was cold, but after wrapping her up, with a hot bottle to her feet, the window was well opened. Her color improved in a few minutes and the sweating ceased soon after. But it and the blueness returned if the window was shut for any time. It was directed to be kept open night and day, and I could see from my house that this order was carried out. Although on one night the thermometer showed 14° F. of frost the chest was clear of noises and she was convalescent in eight days. If fresh air needs warming she ought to have died. Why do most men feel so tired after an afternoon's work in a crowded out-patient room? Why is a long journey in a full railway carriage, even with a comfortable seat, so exhausting to many people? Personally an hour or two in a full carriage with the windows shut will give me numbness in my feet and legs and knock me up for the day, while a railway journey in an empty carriage with open windows does not affect me at all. But most people will be willing to admit that any kind of crowd is tiring. It is to me difficult to resist the impression than an overdose of waste products, whether of one's own or other people's, must generally interfere with the metabolism of nerve tissue. Women as they grow older are apt to live much indoors. I believe the fat, flabby, paunchy woman, whether purple or pale, with feeble, irritable heart and "inadequate" kidneys, is usually the victim of rebreathed air. A "close" room will infallibly give me an abdominal distention and borborygmi within half an hour, and I am inclined to think the purity of the air breathed by the dyspeptic quite as important as his regimen or his teeth. It must, I think, sooner or later be recognized that many of the increasing ills which it has been the fashion to charge on the "hurry and brain fag" incidental to a high state of civilisation and a large population are in reality due to the greater contamination of the air we breathe by the waste products of that population, and that toxines excreted by the lungs will in time take high rank among these as both potent and insidious. If this should come to pass, the present ideas anent ventilation must be abandoned as utterly futile, and the need will be felt, not of letting a little air in, but of letting waste products out.

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The Utilization of Wave Power.—The utilization of the energy which goes to waste in the movement of water, in waves, tides, and waterfalls, has been a much-studied problem during recent years. The only one of these three phenomena which has as yet been at all extensively commercially harnessed is the waterfall. There have, however, been a number of wave and tide motors constructed. The most recent and perhaps the most promising of these is the type invented by Mr. Morley Fletcher, of Westminster, England. He has made a special study of the problem of motion of the sea, and has already successfully constructed a hydraulic pump, an electric motor, and a self contained siren buoy in which the energy is obtained entirely from wave motion. The great possibilities in this direction for cheap and efficient power plants have not been appreciated by seacoast towns, but it is stated in *Industries and Iron*, from which we have taken the above particulars, that Mr. Fletcher is at present devoting his attention to devising schemes and designing apparatus for pumping sea water for shore purposes, ore washing, driving electric machinery for town lighting and power plants, buoys for marking harbors with beacons and fog horns, and the many other purposes to which such a constant and inexhaustible source of energy is applicable.

Dispersal of Seeds.—Having described in the *Plant World* some of the provisions of Nature for the dispersal of seeds, Prof. W. J. Beal adds that these various devices, besides serving to extend and multiply the species and promote its plantation on favorable soil, enable plants to flee from too great crowding of their own kind and from their plant rivals and parasites. "The adventurers among plants often meet with the best success, not because the seeds are larger or stronger or better, but because they find for a time more congenial surroundings. Our weeds, for instance, are carried for long distances by man and by him are planted in new ground that has been well prepared. Every horticulturist knows that apples grown in a new country, if suitable for apples, are fair and healthy, but the scab and codling moth and bitter rot and bark louse sooner or later arrive, each to begin its peculiar mode of warfare." So with peach trees and plums and their enemies. The surest way to grow a few cabbages, radishes, squashes, cucumbers, and potatoes is to plant them here and there in good soil at considerable distances from where any have heretofore been grown. "For a time enemies do not find them." Pear trees planted scatteringly are more likely to remain healthy than in orchards. "Perhaps one reason why plants have become extinct or nearly so is their lack of means of migration. As animals starve out in certain seasons when food is scarce, or more likely migrate to regions which can afford food, so plants desert worn-out land and seek fresh fields. As animals retreat to secluded and isolated spots to escape their enemies, so many plants accomplish the same thing by finding the best places with some of their seeds sown in many regions. Frequent rotations seem to be the rule for many plants when left to themselves in a state of nature. Confining to a permanent spot invites parasites and other enemies and a depleted soil, while health and vigor are secured by frequent migrations."

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Commensals.—Curious associations are formed among animals for mutual aid in the struggle for existence. Some of them are societies of the same species, like those of ants and bees; colonies in which many individuals—as ascidians and bryozoa—join into a single mass and act as one; and associations of animals of different species constituting commensalism where both are benefited, or parasitism, when the advantage accrues to only one of the parties. The hermit crab and certain ascidians furnish very fine examples of commensalism. The hermit crab is known as an inhabitant of shells bereft of their proper owners. Some sea anemones also fasten themselves on shells, and seem to prefer those which have been adopted by hermit crabs. The association is shown by M. Henri Coupan, in *La Nature*, to be one of mutual benefit. The actinia defends the crab and its home against all intruders by means of its tentacles—veritable batteries of prickly stings; while the crab, with its long claws reaching out to catch whatever is good to eat, brings food within reach of the ascidian. Mr. Percival Wright, having taken the crab from a shell to which an ascidian had attached itself, found that the latter abandoned the shell in a short time. M. L. Faunt reversed the experiment, taking the ascidian away, when the crab deserted its quarters, found a shell with the ascidian on it, and occupied it very quickly. He further observed the maneuvers executed by the crab to secure the attachment of an ascidian to its shell. Sometimes a large ascidian will wholly cover a shell; or several smaller ones will spread themselves over the same shell so as to form a continuous envelope over it. The ascidians become so attached to their commensals as to seem unable to live without them, and even to die soon after being separated from them.

Drift of Ocean Currents.—Of sixteen hundred and seventy-five floats bearing requests to the finder to return them which Prince Albert of Monaco dropped into the Atlantic during three research cruises, with a view to learning something of the movements of surface currents, two hundred and twenty-six were returned to him up to the year 1892. By working the course which each of them had probably been following, the prince undertook to draw a definite map of the currents. As the elements employed were always numerous for each region, he thinks his results were near the truth in its general lines. The floats landed on almost all the shores of the North Atlantic, from the North Cape to the south of Morocco, along Central America, and on the islands of Canaries, Madeira, Azores, Antilles, Bermudas, Shetland, Hebrides, Orkneys, and Iceland. None appeared as far south as the Cape Verde Islands. The drifts seem to indicate an immense vortex, beginning toward the Antilles and Central America with the Gulf Stream and the equatorial current; passing the Banks of Newfoundland at a tangent, it turns to the east, approaches the European coasts, and runs southward from the English Channel to Gibraltar, after having sent a branch running along the coast of Ireland and the coast of Norway as far as the North Cape. It then returns to the west, encircling the Canaries. Its center oscillates somewhere to the southwest of the Azores. The author's observations enabled him also to establish a very good average for the speed at which these floats traveled in the different sections of the vortex, and for every twenty-four hours: Between the Azores, France, Portugal, and the Canaries, it was 5.18 miles; from the Canaries to the Antilles, the Bahamas, and as far as the Bermudas, 10.11 miles; from the Bermudas to the Azores, 6.42 miles. The mean speed for the North Atlantic was 4.48 miles. The figures are under rather than above the truth.

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Winds of the Sahara.—Some interesting meteorological observations, made in the Sahara during eight excursions between 1883 and 1896, have been published by M. F. Foureau. The most frequent winds are those from the northwest and the southeast. Every evening the wind goes down with the sun, or goes to bed, as the Chaambe express it; except the northeast wind, which the Arabs call *el chitâne*, or the devil, because it blows all night. Another wind, called the *chihithi*, has been mentioned by all travelers, and is the subject of numerous legends. It is a warm wind from the southwest, charged with electricity, and often carrying fine sand and darkening the atmosphere. The compasses are much disturbed by it, because, it has been suggested, of a special condition produced upon thin glass covers by the friction caused by the rubbing of the fine wind-carried sand upon them; but it has been observed that the spare compasses show the

same disturbed condition as soon as they are taken out of their boxes. The disturbance ceases when the glasses are moistened, and does not appear again till they have dried. Several hailstorms were noticed, the hailstones being usually about as large as peas, but larger in the heavier storms. M. Foureau, not having gone as far as the central heights, observed no snow in the Sahara, but was informed that snow falls in the winter on the tops of the *Tassili des Azdjer*, about five thousand feet above the sea. Similar observations have been made by other travelers, and falls of temperature to about 21° F. have been noticed. Very curious mirage phenomena were sometimes observed. Observations of fulgurites, or instances in which the sand had been vitrified by lightning strokes, were not infrequent.

Evolution of Pleasure Gardens.—A lesson in the evolution of pleasure resorts is suggested in a book by Mr. Warwick Wroth on the London pleasure gardens. The history of these places has in some cases a strong family resemblance. They usually began as tea gardens, with a bowling green, tea and coffee, hot loaves, and milk "fresh from the cow," as their chief attractions. If the business prospered, other amusements were added, such as music and dancing, with perhaps the exhibition of a giant or a fat woman. Equestrian performances were given in the more important gardens. The manager of one of them kept on the grounds a fine collection of rattlesnakes, one having nineteen rattles and "seven young ones." "Sixteen hundred visitors were present at another one day in August, 1744, to hear honest 'Jo Baker' beat a trevally on his side-drum as he did before the great Duke of Marlborough at the bloody battle of Malplaquet. It was not unusual, moreover, for the owner of a successful tavern to discover on his premises a mineral spring, of which a favorable analysis was easily obtained"—although the spring might be really a bad one. The Spa of Hampstead Wells enjoyed a delightfully pure and invigorating air on the open heath, and had a tavern with coffee rooms, a bowling green, raffling shops, and a chapel, which offered visitors an advantage possessed by no other gardens in London, as a clergyman was always in attendance, and a couple on presenting a license could be married at once on the payment of five shillings. Mr. Wroth suggests that the license was sometimes dispensed with, and the fee, moreover, was remitted if the wedded pair gave a dinner in the gardens.

A Library of Astronomical Photographs.—The appointment of Mrs. M. P. Fleming as curator of astronomical photographs in the Harvard Observatory is noteworthy because hers is the first woman's name to be placed along with the officers in the university catalogue. It is more so as a recognition of Mrs. Fleming's proved abilities in certain lines of astronomical work. The astrophotographic building is not used for the taking of photographs, but as a peculiar kind of library where the plates secured by the astronomers at Cambridge and Arequipa are preserved, arranged, and catalogued, as is done with books. The duties of the curator are like those of a librarian. But instead of books, of which many copies exist, each of the treasures in the photographic collection is unique and can not be duplicated. Prints of them on paper are of little scientific value, because no paper copy can repeat all the minute accuracy of the original negative on glass; and prints are not taken from them for scientific use, but only for illustration. If one is destroyed it can never be replaced; and it is impossible to predict what fact one of them may embody of the greatest importance to the labors of some future astronomer desiring to compare the aspect of his special object of research at his period and ours. Mrs. Fleming's name is frequently mentioned in the reports of the observatory, and she has distinguished herself in several lines of stellar investigation. She has about a dozen women assistants, some of whom are computers of long experience, and some are known by the discoveries they have made.

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Forest Planting on the Plains.—Mr. Charles A. Keffer, in a report to the Forestry Division on Experimental Tree Planting in the Plains, defines the forestless region of America as including all the States between the Mississippi River north of the Ozark Mountains and eastern Texas and the Rocky Mountains, together with the plateau west of the Rocky Mountains. The possibilities of forest growth in this vast area are yet to be proved. Roughly speaking, any species that thrive in the adjacent wooded region can be grown in Iowa, the Red River Valley of Minnesota and North Dakota, the Sioux Valley of South Dakota and the eastern counties of Nebraska, and in the more southern States. We know that difficulties of cultivation increase as one goes westward, but we can not say where the western limit of successful tree culture is. We can not even define the limits of successful agriculture in the plains, for with increased facilities for irrigation splendid crops are now produced where only a few years ago it was thought desert conditions would forever prevail. It is admitted that forest planting, as a financial investment, will probably be profitable on the plains only in a limited degree. Favorable sites may enable the profitable raising of fence posts and other specialized tree crops, but the growing of timber on a commercial scale can hardly be expected.

A Siamese Geological Theory.—The east coast of Siam as far south as Champawn is characterized by wide bays, with detached masses of limestone set on steep-sided islands or high-peaked promontories with serrated ridges, the most conspicuous of which is Sam Roi Yawt, or the three hundred peaks. The relations of these various rock masses to one another, Mr. H. Warrington Smyth observed, in an address to the Royal Geographical Society, have been long ago lucidly set forth by Siamese geologists, who are unanimously agreed on the subject. "It appears that one Mong Lai and his wife once inhabited the neighborhood (they were giants), and each promised their daughter in marriage, unknown to the other, to a different suitor. At last the day of the nuptials arrived, and Chao Lai and the Lord of Mieang Chin (China) both arrived to claim the bride. When the horrified father found how matters stood—having a regard for the value of a promise, which is not too common in the East—he cut his daughter in half, so that neither suitor should be disappointed. Chao Lai, in the meantime, on finding that he had a rival, committed suicide, and the peak of Chaolai is the remains of his body. The unfortunate bride is to be found

in the islands off Sam Roi Yawt, the peaks of which are the remains of the gifts which were to be made to the holy man who was to solemnize the wedding; while Kaw Chang and Kaw King, on the east side of the gulf, are the elephant and buffalo cart in which the presents were brought."

"The Hell of War."—The Cost of a National Crime and The Hell of War and its Penalties are the appropriate names which Edward Atkinson has given to two essays bearing upon the craze for expansion in which the nation has been abruptly plunged. In them an evil which has not yet received due attention, if any, is presented as sure to be inflicted upon us if the policy of militarism is persisted in. "How much increase of taxation," Mr. Atkinson asks, "are you willing to bear, and how many of your neighbors' sons are you ready to sacrifice by fever, malaria, and venereal disease, in order to extend the sovereignty of the United States over the West Indies and the Philippine Islands?" Another question is put to the missionary enthusiasts: "It may be well to ask all who are imbued with this missionary sympathy, How many young men of your own brotherhood are you willing to sacrifice for each convert? How many of your own sons will you expose to sure infection and degeneration in the conduct of your philanthropic purpose? Or will you satisfy your own conscience by consenting to the necessary conscription of other people's sons when it presently becomes impossible to maintain our armed forces in those islands without a draft?" Mr. Atkinson says that his attention has been called to this phase of the evil attendant upon military occupation in the course of his social studies. "The greatest and most unavoidable danger," he writes to the commander in chief of our armies, "to which these forces will be exposed will be neither fevers nor malaria; it will be venereal diseases in their worst and most malignant form."

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MINOR PARAGRAPHS.

A new and very ingenious method of space telegraphy is discussed at length in an article by Karl Zickler in the *Elektrotechnische Zeitschrift*. It depends on a phenomenon discovered by Hertz in 1887, viz., the influence of certain short wave-length light rays upon electrical discharges. The ultra-violet waves, which are obstructed by glass but transmitted by quartz, are the most effective. The source of light is an arc lamp. The light is passed through a lens of rock crystal to the receiver. The receiver is a glass vessel partially exhausted of air, one end of which consists of a truly parallel plate of rock crystal. In front of the receiver there is a condensing lens of rock crystal, and within the exhausted chamber are the two electrodes, one of which is an inclined disk and the other a small ball. The electrodes are connected with the secondary portion of an induction coil, and when the ultra-violet rays fall upon the inclined disk and are reflected to the ball, a discharge will be produced which may be read either with a telephone or a coherer. The signals are sent by alternately interposing a plate of glass in front of the rays issuing from the transmitter and removing it therefrom. Herr Zickler has made many experiments to verify his conclusions and appears to have demonstrated the feasibility of his idea in practice.

Mr. Dawson Williams has announced in *Nature* the discovery in many susceptible persons of a periodicity in the effects that follow a sting. The immediate result, he says, is a small flattened wheal, pale and surrounded by a zone of pink injection. This is attended by itching, but both wheal and itching are gone in less than an hour. About twenty-four hours later the part begins to itch again, and in a few minutes a hard, rounded, deep-red papule appears, and is quickly surrounded by an area of oedematous skin. The formication is intense, and in the affected area, while the ordinary sensations of touch are dulled, those of temperature and painful feelings are exaggerated. In two or three hours the itching diminishes and the oedema disappears, leaving a small, red papule, which itches but little. The phenomena recur, with diminished intensity, in the course of another twenty-four hours, and may return in this way, growing fainter all the time, in four or five daily repetitions. After these returns have ceased, a small, indolent papule may persist for weeks or months. This periodicity is not observed in all subjects, but most generally in those who suffer most.

Among the advantages of Linde's liquid-air process, Prof. J. A. Ewing, speaking at the English Society of Arts, claimed its giving a means of separating more or less completely the oxygen of the atmosphere from its associated nitrogen. After describing a process by which a liquid consisting largely of oxygen may be produced, the author said that the most interesting application of the liquid which had hitherto been tried on a commercial scale was to make an explosive by mixing it with carbon. When liquid air, enriched by the evaporation of a large part of the nitrogen, was mixed with powdered charcoal, it formed an explosive comparable in power to dynamite, and which, like dynamite, could be made to go off violently by using a detonator. The chief advantage of the explosive was its cheapness, the cost being only that of liquefying the air. Even the fact that after a short time the mixture ceased to be capable of exploding might be urged as a recommendation, for if a detonator hung fire, there was no danger of the charge going off accidentally some time after the explosion was due, nor was there any risk of its being purloined or used for criminal purposes.

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NOTES.

According to the *Tribune de Genève*, twenty new hotels were opened in Switzerland in 1897, and twenty-five were enlarged, adding two thousand beds and making the whole number of beds about ninety thousand. The number of nights' lodgings furnished during the season is estimated at ten million. Supposing each guest to spend twelve francs a day, the total revenue from tourists would amount to one hundred and twenty million francs, or twenty four million dollars.

Classifying the guests according to nationality, it is estimated that the Swiss constitute eighteen per cent of the whole, Germans thirty-four per cent, English sixteen per cent, French twelve per cent, Americans eight per cent, and those of other nations twelve per cent.

A list of women astronomers, compiled by Herman S. Davis from Ribiere's *Les Femmes dans la Science*, contains as contemporary workers in the science the names of seventeen American women who have taken part in astronomical computations or are teachers of astronomy, and twelve who are working in the application of photography to astronomy. Of the women in the later list, Miss Ida C. Martin, Miss Dr. Dorothea Klumpke (now in the Paris Observatory), and Mrs. M. P. Fleming have attained distinction for successful original researches.

The object of the Pure Food and Drug Congress, which met in Washington in March, 1898, with Joseph E. Blackburn, of Columbus, Ohio, as president, is declared in its resolutions to be to secure suitable national legislation to prevent the adulteration of food, drink, and drugs, to secure the enforcement of laws, and secure and promote uniformity of State legislation looking to that end; to create and maintain a high public sentiment on these subjects, to sustain public officers enforcing the laws respecting them; and to promote a more general intelligence concerning the injury to health and business interests resulting from food adulteration. In this work all are invited to join. The congress was in session four days, and several important papers were read to it.

The large Atlantic coastal plain beginning with southern New Jersey, Mr. John Gifford affirms, in *The Forester*, would soon be capable, if protected from reckless devastation, of producing almost limitless quantities of the valuable smooth-bark or short leaf pine. In Northampton and Accomac Counties, Virginia, lying in this plain, the forests are already properly cared for and propagated without the aid of forest laws. This is done by insuring their freedom from fire, which is attended to purely as a matter of present economy. The value of the woods in holding the loose sandy soil and as windbreaks is recognized, and the litter of the pine trees is a precious dressing for the sweet potato fields. This litter, of pine "chats," "needles," or "browse," is carefully raked off every year and spread on the fields, and there is nothing left in which fire can start.

The Lalande prize of the French Academy of Sciences has been conferred upon Prof. S. C. Chandler, of Cambridge, Mass., in recognition of "the splendor, the importance, and the variety" of his astronomical work; the Damoiseau prize upon Dr. George William Hill, of Washington, for his researches in mathematics and astronomy; and the Henry Wilde prize on Dr. Charles A. Schott, of Washington, for his researches in terrestrial magnetism.

Prof. J. Mark Baldwin, of Princeton, author of the books *The Development of the Child and the Race*, *Handbook of Psychology*, and *The Story of the Mind*, has been elected a member of the French Institute of Sociology.

Among the recent deaths of men associated with scientific pursuits we notice those of Charles Michel Brisse, professor at the Lycée Condorcet for twenty-five years, and professor at other French schools, author of papers on the displacement of figures and on the general theory of surfaces, and of other works in mathematics and mathematical physics, and a co-worker on the *Journal de Physique*, in his fifty-sixth year; Prof. H. Alleyne Nicholson, of the University of Aberdeen, author of books on zoölogy and geology; M. F. Gay, of the University of Montpellier, a student of the green algæ, aged forty years; Dr. Dumontpallier, of Paris, author of contributions to the pathology of the nervous system, aged seventy-four years; Lieutenant-Colonel Robert Pringle, of the British Army, author of papers on the hygiene and diseases of India; Pastor Christian Kaurin, of Norway, a student of Scandinavian mosses, aged sixty-six years; T. Carnel, professor of botany and director of the Botanic Garden, Florence; the Rev. Bartholomew Price, author of several elaborate works in mathematics, and secretary of the Oxford University Press, in his eighty-first year; Dr. Constantine Vousakis, professor of physiology in the University of Athens; William Dames, professor of geology and paleontology in the University of Berlin, and subeditor of the *Paläontologische Abhandlungen*, in his fifty-second year; and Dr. Gottlieb Gluge, emeritus professor of physiology and anatomy in the University of Berlin and author of an atlas of pathological anatomy, aged eighty-six years.

FOOTNOTES:

- [1] An absurd suggestion made by the State Superintendent of New York.
- [2] In order to get at the full amount of plunder, I ought to know how much the beneficiaries of tariff and other laws pocket. But statistics on this point are unfortunately not to be had. The amount must, however, be very large.
- [3] These figures represent the expenditures before the war with Spain. That deplorable event will increase them considerably.
- [4] It has been suggested by J. Novicow that, by a competition of this kind among nations, an improvement in legislation might be forced upon them.
- [5] As in the demand of Johnny Powers, the great Chicago boss, for the removal of Hull House from his ward, politics often leads to hostility to the work of philanthropists to ameliorate the condition of the poor. Another striking example of the same evil was the failure of a Quay legislature to provide for the maintenance of the State charitable

institutions of Pennsylvania, and its sham investigation of the pitiful condition of the inhabitants of a mining district.

- [6] Advance sheets from *The Races of Europe*, in press of D. Appleton and Company, many footnotes and detailed references being here omitted.
- [7] *Popular Science Monthly*, October, 1898.
- [8] Consult Taylor, 1890, p. 48; Von Luschan, 1889, p. 198; Sax, 1863, p. 97.
- [9] Consult Fligier, 1881. Stephanos, 1884, p. 430, gives a complete bibliography of the older works. Cf. also Reinach, 1893 b, in his review of Hesselmeier; and on the supposed Hittites, the works of Wright, De Cara, Conder, etc.
- [10] Stephanos, 1884, p. 432, asserts the Pelasgi to have been brachycephalic, while Zampa, 1886 b, p. 639, as positively affirms the contrary view.
- [11] Nicolucci, 1865 and 1867; Zaborowski, 1881; Virchow, 1882 and 1893; Lapouge, 1896 a, pp. 412-419; and Sergi, 1895 a, p. 75, are best on ancient Greek crania.
- [12] 1896 a, p. 414.
- [13] Stephanos, 1884, p. 439.
- [14] Philippson, *Zur Ethnographie des Peloponnes*. Petermann, xxxvi, 1890, pp. 1-11, 33-41, with map, gives a good outline of these. Consult also Stephanos, 1884, pp. 422 *et seq.*
- [15] Cf. Couvreur, 1890, p. 514; and Freeman, 1877 d, p. 401.
- [16] Weisbach, 1882; Nicolucci, 1867; Apostolides in *Bull. Soc. d'Anth.*, 1883, p. 614; Stephanos, 1884; Neophytos, 1891; Lapouge, 1896 a, p. 419. Von Luschan, 1889, p. 209, illustrates the similarity between the Greek and the Bedouin skull.
- [17] 1889, p. 209.
- [18] Neophytos finds 82.5 per cent of dark-brown or black hair, only five per cent blond or red; while seventeen per cent of the eyes were dark among two hundred individuals.
- [19] 1886 b, p. 637.
- [20] Vambéry, 1885, divides the Ural-Altai family into five groups—viz., (1) Samoyed, (2) Tungus, (3) Finnic, (4) Mongolic, (5) Turkish or Tatar.
- [21] On terminology consult Vambéry, 1885, p. 60; Chantre, 1895, p. 199; Keane, 1897, p. 302.
- [22] Complete data on these people will be found in Ujfalvy, 1878-'80, iii, pp. 7-50; Les Aryens, etc., 1896, pp. 385-434; Bogdanof, 1888; Yavorski, 1897.
- [23] Ujfalvy (Les Aryens, etc., 1896, p. 428) found chestnut hair most frequent, with twenty-seven per cent of blondness, among some of the Tadjiks. The eyes are often greenish gray or blue (Ujfalvy, 1878-'80, iii, pp. 23-33, tables).
- [24] On the anthropology of European Turks, Weisbach, 1873, is the only authority. He found an average cephalic index of 82.8 in 148 cases. Elisyeef, 1890-'91, and Chantre, 1895, pp. 206-211, have worked in Anatolia, with indices of 86 for 143 individuals, and 84.5 for 120 men, respectively. Both von Luschan and Chantre give a superb collection of portrait types in addition.
- [25] Read Pruner Bey, 1860 b; Howorth; Obédénare, and especially Kanitz, 1875, for historic details.
- [26] 1889 a, with map, in Petermann, 1889 b. Cf. criticism of his contention by Oppel, 1890; Couvreur, 1890, p. 523; and Ghennadieff, 1890, p. 663.
- [27] Auerbach, 1898, p. 286, gives a full summary of the rival controversy between Roumanians and Hungarians as to priority of title in Transylvania.
- [28] Cf. Picot, 1883, in his review of Tocilescu; and Rosny, 1885, p. 83.
- [29] Picot, 1875, pp. 390 *et seq.*
- [30] Auerbach, 1898, p. 211.
- [31] 1891, p. 30. Dr. Bassanovitch has most courteously sent me a sketch map showing the results of these researches. Deniker, 1897, p. 203, and 1898 a, describes them also.
- [32] Deniker, 1898 a, p. 122; Weisbach, 1877, p. 238; Rosny, 1885, p. 85.
- [33] 1879, p. 233.
- [34] 1893, p. 282.
- [35] *Popular Science Monthly*, October, 1898, p. 734.
- [36] 1891, p. 31. Women dolicho-, twenty-five per cent; meso-, forty-two per cent; brachycephalic, thirty per cent; while among men the percentages are 3, 16, and 81 ± per cent respectively.
- [37] *Popular Science Monthly*, January, 1899, p. 350.
- [38] Bassanovitch's series of 1,955 individuals averages only 1.638 metre. *Op. cit.*, p. 30. Auerbach, 1898, p. 259, gives an average of 1.63 metre for 880 Wallachians in Transylvania. Obédénare, 1876, p. 374, states brown eyes to be most frequent in Roumania.

[39] This table of statistics need not be quoted here in full. The following section, embracing the ten years prior to 1889 and including 1884, will suffice:

YEAR.	Date quota filled.	Hauling grounds driven.	Number of drives.	Killed on land.	Killed at sea.
1879	16	71	36	110,411	8,557
1880	17	78	38	105,718	8,418
1881	20	99	34	105,063	10,382
1882	20	86	36	99,812	15,551
1883	19	81	39	79,509	16,557
1884	21	101	42	105,434	16,971
1885	27	106	63	105,024	23,040
1886	26	117	74	104,521	28,494
1887	24	101	66	105,760	30,628
1888	27	102	73	103,304	26,189
1889	81	110	74	102,617	29,858

[40] An address to the students of Mason University College, Birmingham, at the opening of the session, October 4, 1898.

[41] Pascal Duprat, born at Hagetman (Department of the Landes), March 24, 1816, was professor of history at Algiers and at Paris. He took the direction of the *Revue independante* in 1847; founded with Lamennais the journal *Le Peuple constituant*, and was an ardent promoter of the Revolution of 1848. Having become a member of the National Assembly, he opposed the *coup d'état* of Louis Napoleon Bonaparte. Being obliged in consequence of this act to exile himself, he retired to Belgium and afterward to Lausanne. He did not return to France till after the war of 1870, and died in August, 1885. The most interesting of his works is the Historical Essay on the Races of Africa (*Essai historique sur les Races de l'Afrique*, 1845).

[42] *Les Singes domestiques*. Paris, 1886.

[43] *Sketch of the Evolution of our Native Fruits*. By L. H. Bailey, New York: The Macmillan Company. Pp. 472. Price, \$2.

[44] *The Tides; and Kindred Phenomena in the Solar System*. The Lowell Institute Lectures for 1898. By George Howard Darwin. New York: Houghton, Mifflin & Co. Pp. 378. \$2.

[45] *Elementary Zoölogy*. By Frank E. Beddard. New York: Longmans, Green & Co. Pp. 208. Price, 90 cents.

[46] *An Introductory Logic*. By James Edwin Creighton. New York: The Macmillan Company, pp. 392. \$1.10.

[47] *The Workers: an Experiment in Reality*. The West. By Walter A. Wyckoff. New York: Charles Scribner's Sons. Pp. 878. \$1.50.

[48] *Manual of Determinative Mineralogy, with an Introduction on Blowpipe Analysis*. By George J. Brush. Revised and enlarged, with entirely new tables for the identification of minerals. Fifteenth edition, first thousand. New York: John Wiley & Sons, pp. 312.

[49] *A Manual of Chemical Analysis, Qualitative and Quantitative*. By G. S. Newth. New York: Longmans, Green & Co., pp. 462. \$1.75.

[50] *Human Immortality. Two Supposed Objections to the Doctrine*. By William James. Boston: Houghton, Mifflin & Co., pp. 70. \$1.

Transcriber's Notes:

Obvious printer's errors have been repaired, other inconsistent spellings have been kept, including inconsistent use of hyphen (e.g. "newcomers" and "new-comers").

Some illustrations were relocated to correspond to their references in the text.

*** END OF THE PROJECT GUTENBERG EBOOK APPLETONS' POPULAR SCIENCE MONTHLY, MARCH 1899 ***

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