

Ever since the establishment of Girton College, students in residence have valued their prospective right to have a voice in the management more dearly than would generally be credited, and have held that Girton stood first among colleges for women partly because it conferred this dignity upon its students.

But the dignity conferred by the actual enjoyment of a privilege exceeds that conferred by a prospective right to the same privilege.

ANOTHER CERTIFICATED STUDENT
OF GIRTON COLLEGE

"Suicide" of Black Snakes

IN NATURE, March 13, p. 452, Mr. Edward Hardman, Government Geologist of Perth, West Australia, mentions an instance of the suicide, by its own venom, of a black snake. The snake had been wounded, and, the wounded part having been attacked by black ants, "it instantly turned short round and hit itself twice on the neck with seeming determination; in less than one minute it was dead." Mr. Hardman believed the death to be due to its own venom.

He records further instances, which, though he had not witnessed himself, had been related to him by those who had witnessed the facts.

I believe it to be a generally accepted opinion among thanatophidologists that, from what is known of the virulent properties of snake-poison, though fatal to man and other living beings, it is innocuous in its effects to serpents of like nature. Sir Joseph Fayer, a great authority upon this question, has said: "Strange to say—and this to me is one of its greatest mysteries—a snake cannot poison itself or one of its own species, scarcely its own congeners, and only slightly any other genus of venomous snake, but it kills innocent snakes quickly" (address on "The Nature of Snake-Poison," delivered at a meeting of the Medical Society of London, January 28).

The glands which secrete such venom draw their secretion from the blood; that blood, therefore, must have within itself, as part of itself, the elements which constitute its virulence, and cannot therefore be injuriously affected by a further introduction of these elements. Their presence in the blood gives to this vital fluid a power whereby an immunity is obtained, somewhat similar to that which vaccination and syphilisation give to human beings, and which the vaccination of the cultivated virus of anthrax, of rinderpest, of foot and-mouth disease, gives to animals.

It may, however, happen that the climate of Australia has a special action producing effects different from those observed in India, and, if so, requiring close investigation and study.

The question becomes an interesting one, and, if philosophically prosecuted, may elicit facts which would give to this instance of venom envenoming itself a significance and an established position in the history of natural science.

JAMES DONNET

Unconscious Bias in Walking

THIRTY or more tests in walking, with closed eyes, on a nearly level lawn lightly covered with newly-fallen snow, gave the following results:—My natural gait, in which I step a half to three-quarters of an inch further with my right foot than with my left, always produced a sharp curve to the right. Whenever the step made by either foot was about three inches greater than that made by the other my course was substantially straight. A curve to the left always resulted when either foot stepped more than three inches further than the other. Unnatural toeing out of either foot did not change the result. My right arm is three-quarters of an inch longer than my left, but my legs are of equal length. Both limbs on my right side are stronger and more skilful than those on the left. When but a single action is required, it is my right arm or my right leg that prefers to perform it. When two actions are necessary, the right side chooses that requiring the greater skill, leaving to the left the plainer work, regardless of the power demanded by it. Thus, in mounting a horse, or leaping across a ditch in the ordinary manner, I spring from the left foot; yet if I am to land on the foot from which I start, I can hop higher and farther with my right leg. I can also lift a greater weight with it; and can lower myself to, and raise myself from, a kneeling position with the right leg alone—a feat impossible for me to perform with the left. In my case, at least, the division of labour is decided by skill, and not by strength. The facts, considered in connection with the further

observation that in walking the foot which for the time being supports the person does not rock into a pushing position until the other foot has completed its forward motion and is ready to drop to the ground, incline me to the opinion that walking is a reaching rather than a pushing process. Perhaps photography may help to decide this point.

J. E. SMITH
New York, March 10

Recent Weather in North America

THE ice-storm, as we call it, which we have lately experienced, seems to call for a permanent record. It began at about 4 p.m. on the 7th inst., and until 12 noon of the following day there was a constant drizzle or rain, the thermometer being a few degrees below the freezing-point. The amount of the rainfall at the surface of the ground was 1.10 inches. As the rain fell upon the trees it soon formed a coating of ice upon every exposed branch and twig, and this grew thicker and heavier until saplings were bent to the ground and large branches were broken from many trees over a wide area of country. The wind blowing gently from the north, the coating of ice was much thicker on that side of each twig or branch. Fences were decorated with long icicles hanging at a decided angle towards the south. Telegraph wires were so heavily loaded that many fell, and some of them, besides the coating of ice, had a most curious decoration in the shape of little icicles hanging about two inches apart, some of them appearing horizontal, and some (it is said) actually pointing upwards. The storm is reported as having extended over an area of some 20,000 square miles. It was not immediately followed by a thaw, which might have relieved the trees of their load; a gentle precipitation, partly of snow and partly of sleet, took place at intervals from 5 p.m. on the 8th till early in the morning of the 10th, the temperature remaining below freezing. The view on the 10th, when the clouds broke away and the sun shone on the trees, was beautiful beyond description, but the most remarkable effect was that produced by the moonlight on the evening of that day.

In order to gain something like an accurate idea of the amount of ice which had frozen on the trees, I made measurements of a number of twigs taken from the extremities of branches, in order to compare their diameter in their natural state with that they had when covered with ice. Some of the figures may be of interest. One twig .11 of an inch in diameter was enlarged to .73; another of the same size to .84; one of .12 inch diameter measured .84 with its ice-covering, and another of .12 inch measured 1.03; one of .18 diameter had become 1.21, and one of .21 had become 1.07. The largest ratio of increase which I found on a tree was in the case of a twig .09 of an inch in diameter, which had attained to .97, having gained nearly nine times its original diameter. But some upright stalks of weeds standing about eighteen inches above the ground gave still larger proportional measurements. One 5/100 of an inch in diameter now measured .87, and another of 4/100 of an inch measured .85, having increased its diameter by more than twenty times.

I made another estimate of the quantity of ice on the trees by breaking the ends of some branches from an apple-tree and weighing them with and without the ice that coated them. It appeared that wood which weighed ten ounces was carrying ice which weighed sixty-nine ounces.

Perhaps it should be noted that the ice did not freeze on the twigs or stalks so that the cross-sections would be exactly circular, and that the measurements made were those of the largest diameters in the several instances.

Prof. Brocklesby writes to the papers of a similar storm many years ago, when a piece of branch weighing four ounces carried four pounds of ice.

SAMUEL HART
Trinity College, Hartford, Conn., March 11

EDUCATION IN THE UNITED STATES¹

A SUCCESSFUL effort made to meet a strong desire that this Report should be brought out sooner enables us to call attention to it in less than twelve months after the last, but, as in material food so in the case of the many reports embodied here, thorough digestion has been essential.

¹ "United States Report of the Commissioner of Education for the Year 1881." (Washington: Government Printing Office, 1883.)

An additional interest, moreover, is lent to this Report by the working up of the information supplied by a Compendium of the Census of 1880. Here are given very full particulars of the changes in distribution of population during the last ten years, and of the amount of education still required by its various classes.

As to the former we may mention in passing that the Report calculates that more than half the English-speaking people of the earth live now in the United States, which in size and population has become the fourth nation of the world. Rather more than one-eighth, six and a half out of fifty millions, of its inhabitants are immigrants; and a singularly similar proportion exists between the coloured and the white population. Emigration is a stream westwards, not only across the Atlantic but across the continent of America. While 1,211,000 of the population of the State of New York were immigrants to it, 882,000 had emigrated from it. Nearly 10,000,000 out of 43,000,000 of natives had moved from the States of their birth to other States. It would seem to an Englishman in his own land that this "unsettled" state of the country must loosen all the feeling of attachment to the soil suggested by the word "home"; but it must, as the Report describes, tend immensely to consolidate the widespread territories; and it certainly suggests the fairness of the great work of education being made a national and not a State function.

Of the emigrants from Europe there were twice as many from Ireland as from Great Britain, but the Irish were equalled in number by the Germans alone, and the total Teutonic immigration in proportion to that of Irish was as 40 to 18. "The preponderance, therefore, of Celtic methods and ideas among our immigrant population is at an end, at least for the present. The German, Scandinavian, and British elements will exert an ever-increasing Teutonic influence, and will form a strong, steady, and sensible influence to counterbalance the volatile and brilliant qualities of the Irish blood. Not the least among the attractions which have drawn to America the Swedes, Danes, and Norwegians whose steady industry and stalwart vigour is felt with immense effect along the northern border States and Territories, are the schools, to which they give their hearty support. In these schools they find less of class education in America even than in Germany, where the children are separated, the high from the low, the rich from the poor, at the entrance into the school-room; instead of the social intercourse, the common interest, the mutual enjoyment which may be the result of the American public school." Nor is all the advantage to the immigrant only. "The influence of the Germans has been exercised in behalf of better methods of primary instruction, thorough training, and high standards in the intermediate and higher grades, the introduction of the German language into the schools, and science training, especially as related to the development of our internal resources." Much do we want more of a similar element in England! Much information is condensed in sixteen diagrams or outline maps showing at a glance various results of the census.

A list is given of 251 "cities," towns, that is, containing over 7500 inhabitants. Belonging to these are—

17	per cent.	of the population;
26	"	" daily attendance;
33	"	" annual school income;
49	"	" school property.

Nothing can speak more strongly than the above figures of the advantage to education afforded by the concentration of population such as is the case in England. Even in a country where the rural population forms five-sixths of the whole, and is felt to be of vastly greater importance than it is in England, only one-half of the school property and two-thirds of the income is devoted to them;

whereas, to secure equal advantage to the scholars, these proportions ought to be more than reversed. As it is, a rural school and an ungraded school are almost synonymous, and more exact reports from each State of their efficiency and means are strongly urged, and their want of trained teachers regretted. But even in the cities the population keeps ahead of the provision of "sittings," till New York already requires over 50,000, and Brooklyn and Chicago over 30,000, more than their present supply. The latter has been driven to the certainly unhealthy practice of "double divisions," teaching, that is, one set of children after another within twenty-four hours. Very far, therefore, are these large cities from carrying out the suggestion here quoted from the London School Board, of providing schools beforehand for increasing population.

The excess of female over male teachers has become a national characteristic, and our Report accounts for it not only by the superior attractions of pioneer life for the men, for it is the case even in States where men largely preponderate; but also by the industry and intelligence which have become the inherited tendencies of the women of the Northern States. In the colleges, accordingly, we note that just over ten thousand women are being co-educated with men, and "the experience of these institutions shows that co-education is entirely practicable, and is recommended by their officers upon considerations of economy, its agreement with the conditions of family life, and its practical results." The equal capacity of women with men for higher education, our Report asserts, has been conceded both in Europe and the United States; and it quotes elsewhere the large increase of female pupil-teachers in England compared with the corresponding increase in males. Extra care has been given to the reports on this subject, both on account of the attention directed from other countries upon the United States and also because it may well form a standard of social progress. But the "meagre wages" of which the Report speaks are illustrated by the fact that even in Pennsylvania, where excellent provision is made for the examination and appointment of teachers, the average salaries for men were about 40% for the six months' teaching required in the year, and 33% for women, while in Alabama the average was only 20%. A large increase in the number of female students at the normal colleges shows, however, that these wages are not to be spurned, if they do not attract the highest talent desirable. All Bills introduced into Congress agree in providing that a large part of the national aid proposed shall be applied to the increase of teachers' salaries. It would seem, however, that the difficulty of the thinness and dispersion of the population causing schools to be small, and therefore education per head costly as well as inefficient, is rather increased by an unwise feeling of independence which objects to be joined with neighbouring districts, even where distance allows it. To gratify this same feeling, also, the State Government, after laying down wise and complete rules, has left in some cases to the school authorities and to the people themselves in each city or town, the whole practical control of the work. It is like passing an Act of Parliament without making it the duty of any body of men to see that it is enforced. A State supervision is a step towards centralisation, which is, no doubt wisely, recommended strongly by our Report.

The desirability that curriculums should be laid down by the central authority is quoted as the experience of the world, and of Belgium particularly, where, whenever the schools have followed definite programmes, progress has been marked, while in schools in which the whole matter has been left to the teachers routine has prevented it.

The long recesses, caused in a new country by the scarcity of labour during harvest times, so shorten the educational year that while on the one hand it is felt that not enough is provided for in the curriculum of most schools, on the other hand, time is too short to allow the

effective teaching of what is already there. The Report remarks that it is impossible to examine the various courses without being struck with the general neglect of elementary science; adding that "the rural schools would seem to be favourably situated for the study of nature in some of her varied aspects. The well-known effect of such study upon the mind, its value as a resource to the individual, and its relation to the tendency of modern thought, are so many reasons for its introduction into these courses."

The higher classes, we are told, are working harder at the schools, but the key to the reports from so many States in which population as well as cost and efficiency are said to have increased while attendance has not, evidently is that a class is rapidly increasing in America now who make no demand for education and do not appreciate it. The chief of the four recommendations with which the Report ends is the appropriation of more national land for the purposes of education in impoverished portions of the country. Yet the special reports of New York and Connecticut show that ignorance is not caused by want only: for the reduced attendance is accounted for by commercial prosperity and demand for labour, during which a hard-struggling population is tempted to forsake school in order to earn money.

Maryland reports great illiteracy among both blacks and whites, and shows a decrease in everything except expenditure. North Carolina is much more satisfactory, partly through the help of religious bodies, who are making great efforts for the benefit of the negro, whose education remains the difficult question of the United States. More than half as many more black children are uneducated in the whole Union than white children. From the Report it is evident that many of the Northern States feel that they are already heavily taxed for the support of their own schools. Yet their wealth is immense compared with that of the Southern States; the Report quotes personal property and real estate as two and a half times greater per head in the three States of New York, New Jersey, and Pennsylvania than it is in the south. Again, it is a small class in the north that does not appreciate education, but in the south not only is the negro himself careless about it, but there is often to be found among the whites a bitter hatred of the educated black. It is absurd to leave a difficult and costly matter like his education in the hands of his late masters, and expect them to both do it and pay for it; and the only practical method is, as our Report recommends, for the nation to establish and maintain good schools in the face even of hostility. In some places where the Peabody Fund is pushing the work on, the negro is better cared for than the white child, but its administrators cannot undertake the education of a whole people.

The endeavour to make elementary science a feature of the higher grade schools has revealed the same difficulty as has been pointed out at home, viz. the lack of teachers prepared to give the instruction. "The lifeless routine of memorised recitations is worse than useless in science. It paralyses the faculties by which the facts of science are apprehended, and renders true progress impossible. This is a matter demanding attention in normal schools." In a few cities special means have been provided for meeting the emergency. In Boston, courses of lectures were given successfully by the professors of the Institute of Technology upon different branches of natural science, designed to meet the want of teachers; and a similar course before the Teachers' School of Science, on physics, zoology, botany, and geology, were well illustrated by experiments and specimens, and attended by 400 teachers, the entire expense being borne by two ladies. The Lawrence Scientific School, Harvard University, teaches all the principal sciences experimentally, students being assisted also by scholarships. Many women in the normal col-

leges are now giving special attention to them. A branch specially recommended to be taught there is the laws of health. Of all agencies these normal schools can do most to promote the systematic training of the body. A gymnasium, the study of physiology, hygiene, and sanitation are urged as invaluable to teachers, and it is to them that we must look in some measure for the diffusion of knowledge with reference to the laws of health. A quotation from Dr. Schrodt is made, almost equal to saying that every boy when he leaves school "ought to be either a fool or a physician"! The laws of health should be made as familiar to the minds of children as the rudiments of language and numbers. We are glad to note in Prof. Hitchcock's report on college hygiene that he recommends simultaneous care of the digestive organs with relaxation of mental effort, rather than violent exercise, for students. A larger number of the training schools report laboratories, museums, &c., and the Bureau urges the usefulness of an educational museum from which it would circulate illustrations of the most improved appliances.

Passing to more specialised education, hardly any schools have increased in every way more than commercial and business colleges; there were one-fourth more establishments and scholars than in the previous year.

Kindergarten schools had more than 60 per cent. more scholars. They may well be supported if they carry out all that their programme lays down, which includes, and indeed places foremost all that ought to be the work of home, and uses the word education in its very widest sense. The training described in the normal kindergarten schools surely must wonderfully assist all the students in their future duties as mothers; and an orphan in the care of one of these schools, many of which are carried on as charities, is hardly to be pitied!

Two fewer colleges, but more property and greater teaching power, with 3000 more students, shows that the multitude of these institutions in the United States is being checked by natural selection, while greater efficiency is found among the surviving fittest. Much interchange of the inhabitants of the various States to the Universities of others takes place. There is happily hardly any local feeling in favour of attending a college in the student's native State, and there could hardly be a more unifying action upon a population like that of the United States than this of students meeting from all points to disperse again and take influential positions in all quarters.

At Harvard College the President remarks that the scientific turn of mind is comparatively rare among the young men who enter the college, a large majority of the students preferring languages, metaphysics, history, and political economy to mathematics, physics, zoology, and botany—perhaps the result of the training in the secondary schools. But studies made to a great extent elective have not led to the choice of those requiring least effort. Many more selected scientific subjects in their senior than in their junior years. At Columbia College geology was elected by every member of the class, and astronomy by all but one. About three-fifths selected chemistry, two-fifths philosophy, and one-fifth political economy. Studies are thus selected in harmony with tastes and proclivities, and pursued with interest and satisfaction. "The mental discipline incident to the study of chemistry especially entitles the science to take a place among advanced courses of study, a truth recognised by many collegiate institutions, both by giving the science increased attention in fixed courses, and also by placing it on an equality with classical and mathematical studies when the elective system has been adopted."

Well worthy of the attention of all friends of technical education in England are the numerous efforts to carry out the same desirable ends in the United States. A school of applied science has been organised at Cleveland, Ohio, for this purpose. "The course of study will

be four years in length. One half the time will be spent in a careful study of mathematics, chemistry, physics, modern languages, and the methods of scientific research, the other half in professional studies in some department of applied science, as mechanics, in which are unfolded the laws of natural forces underlying processes and existing in materials. Mathematics has given the rules of calculation; drawing, a skill of eye and hand; and shop-practice, familiarity with actual labour accurately performed." Fourteen similar institutions during the last ten or twelve years have been started, but in all of them, as may be expected in a new country like America, the great demand is for knowledge in the arts of working wood and iron; the former is taught from felling the tree to cabinet-making, and since little of such work can be done without the aid of the companion art of working metals up into tools and machinery, they are, in varying proportions, taught together in nearly all. Several schools report that the time—in some cases two afternoons a week—assigned for shop-work did not diminish the intellectual tasks required. Rather less ambitious in its aims, but excellently practical, is the Worcester County Free Institute, founded by some gentlemen of wealth for the training of boys for the duties of an active life, "broader and brighter than the popular method of learning a trade, and more simple and direct than the so-called liberal education." The education there is based on mathematics, living languages, physical sciences, and drawing, but the distinguishing feature is the method and amount of practice in a machine-shop. A manual training school also at Boston and a school for miners and mechanics of a little lower grade still at Drifton, Pa., are schools in each of which an increasing proportion of time is devoted to technical subjects, in the latter entirely free.

On the whole, nevertheless, with seven and a half million dollars bequeathed for educational purposes during 1881, our Report regretfully remarks this year that the "claims of science do not seem to be sufficiently regarded by the benefactors of learning." While these various schools of science have increased in number slightly, and teachers and pupils by about one-tenth, schools of theology, though similarly increased in number, have lost one-tenth of their pupils.

Like the higher colleges, the schools of law have fallen off in number, but they contain more pupils. The influence of their work as affecting all future legislation in the States, and therefore the importance of their pupils being grounded in the science of legislation and not learning it in offices only by the rule of thumb, is wisely urged. Here it is history which is chiefly required to underlie "technical" training. Still more must every one feel the necessity for a high moral as well as mental standard in a profession that has in these days gathered such despotic powers to itself.

Many weighty remarks, similar to those we referred to last year, on the insufficiency of the medical course of study, are to be found in this Report. The necessity of elevating the standard of medical education is universally admitted, and a general improvement to some extent is noted. It is evidently entirely in the hands of the Universities, for themselves report that, where the standard has been raised, students have by no means fallen off, but the reverse; and medical men know well that where diplomas differ in standard, the highest are well worth working for. The importance of the degree to this profession is also shown by more being taken in medicine than in anything else, and more in medicine and science together than in letters, law, and all other subjects.

On no point does England show to such disadvantage by the side of the United States as in the matter of free libraries. It is the more inexplicable because the marvellously, not to say unfairly, cheap literature there, together with the scattered habitations, would each tend

to every man's house being his library; while in England the exactly reverse conditions of costly books and closely packed population must make free libraries a most convenient arrangement. Yet in the United States seventy-one additional libraries with 178,000 volumes were started in 1881, making up nearly 4000 libraries with 13,000,000 volumes. "The true aim in the administration of these libraries should be to make the books in them accessible and useful to the greatest number of readers. The time has passed when the preservation of a library was the chief end of its economy. Methods of arranging, classifying, numbering, and charging books affect materially the usefulness of any collection." It well deserves consideration what an influence for good or for evil 4000 librarians guiding the tastes of their readers to one or other class of literature may have. A further step also is being taken in many places. Librarians and the trustees of libraries generally are trying to cooperate with teachers and parents both in selecting and supplying literature for the young; the librarian and the schoolmaster together choosing a number of volumes from the main library to be circulated at the discretion of the latter among his scholars.

An interesting matter for discussion is the principle again laid down by this Report in its remarks upon the defective classes, that those deficient in natural powers, as the deaf, the blind, have as good a right to their education as those with a sound mind in a sound body; that it is a duty and not a charity to educate them effectually. The necessity of a "technical" education also, in their case, *i.e.* teaching them a trade as well as "letters" is clearly urged. This is carried also with success in some cases as far as a college education, and the late President Garfield complimented the authorities of the Deaf-mute College at Washington upon their presenting so many more capable men to the State. This is, in bare fact, true of the college's work; but, like the view taken of much benevolent work, it seems to forget that the same amount of power bestowed upon better material would have done much more for the State, and that this better material is never scarce. It is taking much safer ground to base it upon benevolence which, like the "quality of mercy," will bring a blessing also to the giver.

There are fourteen institutions for the benefit of feeble-minded youth. Our Report pleads for them that money spent on their education will be more productive than that spent on lunatics. The census of 1830 reports 76,895 idiots and 91,997 insane. Inquiry into the cause of such large numbers in a country where overcrowding ought not to be necessary, and the fact that 14 per cent of them had a weak-minded parent and 20 per cent a weak-minded relative, raises a doubt as to the good in the long run of relaxing the natural check to the survival of the unfit. That 33 per cent of the parents are addicted to drink is, alas, a too natural explanation to us in England. There can be no doubt that it would be not only wise State economy, but it would bring very valuable scientific evidence upon the most home-reaching of subjects "to attach to all appropriations for charitable purposes an enabling clause that institutions disbursing this charity should contribute to the commonwealth, in as precise a form as possible, statistics of the origin of the evils they affect to relieve."

Reform schools on the excellent plan of the celebrated Michigan one at Coldwater are increasing in number, and one for females also has been opened in this State at Adrian; and while the argument from benevolence is even stronger for their inmates than for the weak-minded, the economical objection is far weaker, as the morality of colonies like Botany Bay shows that moral infirmities, when not carefully cultivated in goals and prisons, are not so deeply set. Again, while natural checks have a tendency to eradicate *weak* mental powers, they act much more slowly, if at all, in crowded cities against diseased

morality. It is therefore the more necessary to expend money and labour upon the victims of the latter, as is the special aim of the New Jersey State Reform School. The high aim of the Female Industrial School in this State is "to make it such a home that any parent having a wayward daughter may with confidence have her committed for reformation with the assurance that her surroundings will be of an elevating character." The risk of putting a premium upon vice is easily guarded against where private feeling is not allowed to rule.

The system of public instruction in Ontario (Canada) is so highly approved and has been so successful that a detailed account of its principles and organisation is given here; and the lucid, concise *résumé* of the work of other countries supplied in this United States Report would be valuable to many a reader in Europe who has not the time or the taste to go through the more lengthy documents published in his own country. W. O.

PATHOLOGICAL ANTHROPOLOGY

A NEW and important departure in anthropological studies is taken by Prof. Klebs of Zurich in a paper "On the transformations of the human race as a result mainly of pathological influences," read at the recent meeting of the Swiss Scientific Association at Freiburg, and of which we give the leading points. Hitherto pathology can scarcely be said to have been seriously considered at all in the speculations of anthropologists on the evolution of the fundamental human types. Monogenists especially, deriving all from one primeval stock, have sought an explanation of present varieties mainly in *outward* causes, such as diet, social habits, climate—in a word, the environment. Now the learned Zurich professor attempts to refer existing varieties rather to *inward* causes, without of course pretending to deny that these may themselves ultimately to a large extent depend on external conditions.

Prof. Klebs starts with the assumption that the form of the human body cannot be endowed with greater elements of persistence than other varieties of animal species, which may be modified either naturally or artificially, as, for instance, by stock-breeders. Thus, by the laws of heredity, individual characteristics may be blended together, and give rise to new forms within the several specific groups. The intermingling of races amongst civilised peoples tends in this way, not to universal uniformity, but rather to an endless multiplication of forms. But, besides heredity, these results may be brought about by other influences which make themselves felt, especially during the period of growth, and in a less degree in later years. Such are the deformities associated with certain pursuits, the typical and special characters of certain social circles, the aristocratic, agricultural, and other types, familiar examples of which are offered by the lettered, labouring, and criminal classes.

It may be concluded from this decided tendency to variation that the bodily forms, like all other phenomena of the organised world, are subject to continual modification, that they are essentially plastic, sensitive to, and perpetuating the traces of all external influences. Thus the Danish anatomist, Schmidt, finds that the numerous crania recovered from the prehistoric graves in Jutland and the neighbouring islands present the most varied anthropological types, ranging from that of the Neanderthal skull to those of foreign races, which can scarcely be supposed to have had any direct contact with the Danish aborigines.

But amongst the causes producing structural change, none, according to Prof. Klebs, are more effective than pathological affections. It is now well ascertained that the most prevalent ailments, and especially those of an infectious character, are of a parasitic nature, so that their diffusion takes the character of a struggle for exist-

ence between two organisms. Henceforth it becomes possible to study the action of these phenomena on racial and specific transformation.

But modern anthropology has approached this question only from one point. It recognises that within a given population, limited to a definite territory, typical features may be produced, such as those observed by Virchow amongst the Frisians and by Ranke amongst the Bavarians. Yet the former refuses to attribute to rachitis the flat shape of the East Frisian skull, although analogous deviations from the normal German skull are elsewhere also produced by rachitis. A whole series, however, of pathological phenomena have been determined which place in the clearest light the connection between structural change and internal affections.

Cretinism at once suggests itself, the domain and nature of which are best defined by describing it as a malady spread over the Central European highlands, and probably connected with the action of certain upland waters on the production of goitre. It has been found that in Bavaria, Switzerland, and Austria these waters contain certain minute infusoria, which, when introduced into the waters of disaffected localities, produce like effects on the inhabitants.

The bodily structure of cretins, resulting from a premature arrest of the growth of bone, recalls in the most vivid manner the descriptions of dwarfs handed down by popular traditions. Hence it seems not improbable that this degeneracy may at a given point have resulted in the formation of a definite, although possibly not permanently fixed, type. A slight general influence of cretinism may still be detected in many places, as in Salzburg, and especially in Pinzgau and Pongau, where the natives present a striking contrast to those of their kindred, who have been driven by priestly intolerance to quit their homes and settle in the North German lowlands.

The opposite deformity, that is, excessive growth of structure, is also met in upland regions, where its presence recalls the legends of giants who usually dwelt in the same districts as the dwarfs. In fact the greatest irregularity in the length of the body occurs in the highlands, although mountaineers are, on the whole, of shorter stature than lowlanders. Thus the natives of Hasle, in the Bernese Oberland, and those of Elm, in the Canton of Glaris, are above the average height. This has suggested the theory of foreign immigration, a theory, however, supported only by a few local geographical terms of somewhat doubtful origin. In reality this deformity may also depend on pathological causes. At Elm a case has occurred of gigantic growth setting in at the late age of thirty-six and continuing till the death of the subject in his forty-second year. Although we may be still ignorant of the first and true cause of this disorder, the existence of analogous cases in the same locality, the unusual size of the inhabitants, and the established fact of gigantic growth in highland regions, all seem to point at some subtle relation between such pathological phenomena and the nature of the soil. They should perhaps be regarded as due to the action of organisms in the system, as has been shown to be the case with cretinism.

Another series of pathological symptoms is associated with the development of the pigments, which have hitherto been considered as a salient characteristic of races. A distinct relation has already been established between pigmentation under certain pathological conditions, such as the so-called "bronze-skin," and a morbid state of the supra-renal capsules. Since then special attention has been directed to these organs, which would appear to be the chief centre of pigmentary development. It is now found that in the dark races, as among swarthy individuals of the fair races, the medullar portion of the supra-renal capsules is always pigmented. From this remarkable coincidence it may be concluded that to the functional activity or sluggishness of these vascular