SCIENCE.

FRIDAY, MARCH 6, 1885.

COMMENT AND CRITICISM.

THE INCREASED favor with which the orogenic theory of earthquakes — the theory that regards earthquakes as the effect of disturbances due to mountain growth — has been looked upon in recent years must be accounted a distinct gain for physical geology. The volcanic theory, now rationally limited, has long been more popular. It is not long since Mallet, who has been widely quoted as an authority on the question, committed himself to the narrow statement that "an earthquake in a non-volcanic region may, in fact, be viewed as an uncompleted effort to establish a volcano," although he afterwards held a broader opinion. Lyell wrote in the last edition of his 'Principles' (1876), very much as in his first (1830), that "the principal causes of the volcano and the earthquake are to a great extent the same, and connected with the development of heat and chemical action at various depths in the interior of the globe." More lately, Daubrée maintains a similar view, even after referring to the suggestions of Dana, Suess, and Heim, and concludes that "earthquakes seem to be like stifled eruptions which do not find an outlet, about as Dolomieu thought."

One of the chief reasons for exaggerating the value of the volcanic to the neglect of the orogenic theory has been the improper reading of earthquake maps. The map constructed by Mallet in 1858, still the best of its kind, is very commonly quoted as showing a general agreement in the distribution of volcanoes and earthquakes; but it is quite unwarrantable to include the well-shaken regions of Spain or the Alps, for example, in the volcanic district of the Mediterranean. The shocks of demonstrably volcanic origin seldom extend far from their centres: the eruptions of Italy do not disturb the adjacent countries. In the Alps themselves there is now no volcanic action whatever, nor has there been any of significant extent at any time in their geological history, so far as it is known. It is altogether gratuitous to suppose that the frequent tremors felt there result from concealed volcanic explosions; for they find sufficient explanation in the forces that have made the mountains, which are undoubtedly still growing.

Another cause for the former neglect of the orogenic theory was the almost universal belief that mountain ranges had been lifted up or burst out by expansive force from beneath, instead of squeezed and crushed together by lateral compression, as is now widely accepted. The difference has been concisely expressed by Stur of Vienna: formerly it was 'gebirgshub;' now it is 'gebirgsschub.' Of course, as long as geologists were generally of the mind that mountains were produced by uplift from beneath, it was natural to associate surface shocks with smothered volcanic action, whether eruptions followed or not; but, with the disappearance of the idea of uplift as applied to mountain ranges, it is as natural to refer earth-tremors in non-volcanic mountain regions to the crushing forces that produce the disordered mountain structure. There is, indeed, now sometimes seen a disposition to go, perhaps, too far in this reaction, and exclude volcanic action from nearly all share in causing earthquakes. Some of the English observers in Japan, a volcanic region *par excellence*, are of this mind, and attribute the numerous small shocks, even there, to structural and not to volcanic disturbance. It is a difficult matter to decide. Indeed, the study of earthquakes must, in great part, long remain in a two-thirds condition. Observations are plentiful, hypotheses have never been lacking; but verification can hardly ever be attained.

THE LACK OF final and convincing verification

of hypothetical views has, however, not prevented attempts at the prediction of earthquakes, and the earthquake prophet must have his mention. Falb, an Austrian, figured in this *rôle* some years ago with such apparent success as to inspire an Italian admirer to compose a sonnet beginning

'O uom, che non puoi tu?'

More recently, Capt. Delaunay of the French marine artillery, and evidently a very different man from the eminent mathematician of the same name, made something of a stir by his predictions. In spite of severe criticisms from Faye and Daubrée, he persisted in maintaining that the Krakatoa outburst resulted from the conjunction of Jupiter and the swarm of August meteors, as he had foreseen it would. Worse than this, he announces a more violent 'seismic tempest' in 1886.3, when the malevolent Saturn lends a hand; and colonists in Java are reported to be troubled thereby! Another method of forecasting is discovered by Mr. Charles Zenger, who finds that electric and magnetic storms, aurorae, tempests, earthquakes, and volcanic eruptions, — all, simply enough, result from a single cause, whose cycle agrees with a semi-rotation of the sun. Nothing of this would be worthy of mention, had it not soberly appeared in the *Comptes rendus* of the French academy of sciences, where it is airily entered under the heading of 'meteorology.'

A BILL IS TO BE introduced into the legislature of Massachusetts to regulate the practice of medicine. It is framed closely upon those already in force in several states in the union, such as Illinois, West Virginia, Alabama, North Carolina (Ohio, Maine, Pennsylvania, and Texas have bills under consideration), and provides for a board of medical examiners who shall not be connected with any medical school. They are to be appointed by the governor, and their function will be to issue licenses to practise medicine or dentistry, on the basis of a diploma from some legally organized medical college, or of ten years' practice, or of an examination of an elementary and practical character in anatomy, surgery, chemistry, pathology, obstetrics, and dentistry. After July, 1886, *all* candidates are to be examined. This board is to be endowed with legal powers sufficient to carry out the purposes of this act.

It will be noticed that this bill is not framed in the interests of any so-called 'school' or 'pathy,' and contains no allusion, direct or indirect, to points in dispute between such schools. The necessity of some such bill in the interests, not of medical science, but of ordinary decency and humanity, is probably hardly appreciated by more than a small fraction of the community, even of the more intelligent portions. One often hears expressions used implying that the user supposes that a diploma confers the right to practise medicine, while the fact is that nothing of the sort is necessary. The privilege of giving (or selling) medical advice to one's neighbor is regarded by the state of Massachusetts as one of the most fundamental and inalienable of rights, and on a par with "the right to life, liberty, and the pursuit of happiness." The only medical function for which this state legally demands even the pretence of a medical education is the signing of certificates of insanity. The practice of medicine, surgery, and obstetrics, with the right to sign certificates of death, may be legally assumed by any horse-car driver who some cold day feels that his profession demands too much personal exposure, steps from his platform, puts up his sign with an 'M.D.,' and waits for patients. If he publicly calls himself a doctor, he is legally one; and, if he escapes a suit for malpractice, the law cannot touch him.

This bill can hardly be objected to as too strict by any physicians, except of the class just described, or those immediately above it, or, on the other hand, by that portion of the community drawn from all social ranks who consider education as a positive drawback, and medical knowledge as a heaven-born inspiration. Most persons, however, who patronize

this class of practitioners do so out of pure ignorance, and they have a right to ask that the law shall give them some protection against too gross imposition. Those who object that this bill imposes the very minimum of qualification (and any who know how brief a study and how limited knowledge a diploma from a 'legally qualified medical college' may testify to, will be very apt to make this criticism) may be reminded that beginnings must be small; that the public is not yet educated in this intelligent state of Massachusetts to believe that the ignorant patients are entitled to any protection, or that the ignorant doctors are not entitled to the same recognition as any other business-man pursuing his calling under the disadvantages of the lack of early education.

It will be noticed that after 1886 the board will examine *all* applicants; and, although it cannot purify as much as might be desirable the present body medical, yet it can then guard the gates against future intrusions of ignoramuses. The strength of different 'schools' of medicine will undoubtedly compel some distasteful associations upon the board of examiners; but the importance of the interests to be served ought to stifle jealousies, and override etiquette. Purification of the profession can but tend to its unification and to the development of the truth. If we can be assured of a competent knowledge of the fundamental medical sciences in all who undertake to practise it, mere 'pathies' and fads must inevitably die out within the profession, and outside of it can have little practical weight.

JUDGING FROM what the honorary curator of the insect-collections of the national museum writes in to-day's issue, there is no important difference between his views and those to whose words he has objected. All agree that collections of insects need vigilant and unremitting care, and that any museum which does not guarantee that care is no fit depository of valuable collections. The question whether the national museum practically offers such guaranty is a nice one. Judging from the past history of the national collections in general, one would unhesitatingly say it did not. Judging, further, from Mr. Riley's own statements of the present condition of things, the same answer may fairly be given; for a large and growing collection, already one of the most important in the country, with no person in charge, or working under direction, whose services the museum can *command*, is plainly not a place which has any right to invite the deposit of unique objects. Notwithstanding this, the recent growth of the museum gives large, one is tempted to say abundant, hope that what has been accomplished means not only permanence, but progress; that, dependent as it is absolutely upon annual congressional appropriations, these will not entirely fail, since its hold upon both popular and congressional favor is such as to command respect and a certain amount of support. Though it may suffer temporary curtailment at times, it is already too strong to suffer long neglect or to be overthrown.

Nor must we forget that it shows hereby its very right to exist. In no country, more than in a republic, have institutions been more severely subjected to the law of 'the survival of the fittest.' With rare exceptions, all the scientific bureaus of the government are dependent for very life, from year to year, on the will of the people. The coast-survey even, with its extensive corps of picked men and all its refinement of work, unsurpassed by that of any similar body elsewhere, exists by virtue of an annual appropriation. However foreign this may be to the administrative ideas of European nations, it is thoroughly ingrained in our policy, a piece of the unwritten law of the land, a substantial part of democratic life. If through its agency the scientific bureaus of our government have reached their present status, and their work has received such generous praise abroad, even to self-reproach, to what may we not look forward when we consider that they have gained their present standing through the

action of an undying universal law which places before them two alternatives, — progress or death!

But to return to the practical question, whether the national museum is a fit place for the present deposit of unique collections of perishable objects, we may say, that, while the future of the museum seems to be assured, we have no sufficient historical ground for belief, that it will reach stability without serious lapses; and that until it supports a competent salaried chief of its entomological department, with at least one paid assistant, it stands in no position to invite the donation, or to warrant the purchase, of a single valuable collection of such perishable objects as insects. That the time will come when it is properly equipped, we cannot doubt; that it should reach it through the sacrifice of Mr. Riley's, or of any other choice collection, would be a burning shame: this is the immediate risk.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The voice of serpents.

Prof. C. H. Hitchcock's note in No. 104 brings to mind a fact noted in my laboratory, which may be of interest to herpetologists. In the autumn of 1883 a friend brought to me two magnificent living specimens of the common prairie bull snake, Pituophis Sayi. I gave them the freedom of my lecture-room, and they soon made themselves perfectly at home.

One day, while working with a large induction-coil, I bethought me of my snakes, and caught the larger (his length was about five feet), and passed a powerful charge of electricity through his spinal column. As the circuit was broken and made, I was much surprised to hear a faint though perfectly distinct cry from his snakeship. My notes made at the time speak of this sound as similar to the voice of a young puppy.

During a period of a month or more, this experiment was repeated with one or the other of these serpents, and always with this cry of pain or anger.

H. H. Nicholson.

University of Nebraska, Feb. 18.

The collection of insects in the national museum.

In reference to my remarks on the above-named subject, your explanation, that you meant 'the perpetual care of valuable collections' (p. 25), meets my criticism; and there would be no need to recur to the subject, were it not for Professor Fernald's communication on the same page. He there says, "The national museum has appointed an honorary curator, but it might as well be without one as to have one whose entire time is occupied elsewhere." Professor Fernald speaks here without knowledge, and under misapprehension of the facts. The honorary curatorship of insects is not 'worse than useless,' and the curator's time is not wholly 'occupied elsewhere.'

The organic law (Revised statutes, § 5586; Statutes forty-fifth congress, third session, chap. 182, p. 394) authorizes the director of the national museum to claim any collections made by other departments of the government. The national museum has a substantial fire-proof building, and a stable administration. The department of agriculture has a tinder-box, and the administration shares the uncertain influence of politics. Yet connected with the practical entomological work of the department of agriculture, there is much museum work proper; and since 1881, with the approval of the commissioner of agriculture, I have, as U. S. entomologist, looked upon material accumulated for the latter institution as belonging to the former, and have freely given my own time, and that of my assistants when necessary, to the entomological work devolving on the curator of said national museum. The two positions are naturally linked.

I am familiar with most of the insect-collections of the country, and believe, that, during the past three years, more original material has been collected expressly for the national museum, and more has been mounted for it, than for any other institution, not excepting the Agassiz museum at Cambridge, with its excellent insect department under Dr. Hagen; while, including the collection of the department of agriculture, and my own (which is deposited in the museum, and will be donated whenever such donation is justified), there has been by far more biographic work done for it than for any other museum. Even in the Micro-lepidoptera, it is probably next in extent to that of Professor Fernald. The care of museum material is of a twofold nature. The preservation of valuable type-collections requires vigilance, but little labor. The less labor, in some instances, bestowed upon them, the better; at least, so I thought last summer in witnessing the overhauling and re-labelling of Grote's collection in the British museum. The preservation and classification of original material, on the contrary, requires brains, time, and means.

The future and perpetual care of an entomological museum cannot be absolutely guaranteed without endowment; but appropriation to a government institution, though depending on the annual action of congress, is probably the next best security. Hence I agree with all *Science* has said as to the need of proper and substantial provision for such future care of the insect department of the museum. Washington is fast becoming the chief natural-history centre of the country; and the national museum is making rapid strides toward justifying its name, and offers, on the whole, as secure a repository for collections as any other institution. I speak of the museum as it is to-day, and not as it has been. The misapprehension indicated, whether an outgrowth of the amount of natural-history material that has gone to rack and ruin here in the past in other departments as well as in entomology, or a result of present rivalry, is certainly not justified to-day.

Professor Fernald truly remarks that "many museum officials have very little appreciation of the vast amount of labor, care, skill, and knowledge required" to properly manage a large and varied insect-collection. Things are too often valued by their size, and the pygmy bugs have not outgrown popular