long ago as 1806. The act now before the legislature repeals many of these laws entirely as well as the inconsistent and useless sections of the others. We have not had time to compare the proposed law with those which it will repeal, but as the act has been prepared by the counsel of the New York county medical society, who has probably had as much experience in these matters in the courts as any of the lawyers, we presume the repealing clause is right and proper. We are glad to see that provision is also made by which the question of registration will be settled, so that the practice of county clerks throughout the state will be uniform. It will hereafter be necessary for a physician to register in person in but one county, after which registration he will receive a certificate of registration from the county clerk. If he desires to remove his practice to another county, or to engage in practice or open an office therein, he may present his certificate in person to the clerk of that county, or mail it to him by registered letter. On this certificate the clerk will indorse, 'registered also in —— county,' and the physician is then qualified to practise therein.

Another section of the law which is most equitable and just, and one which will remove all cause for doubtful interpretation of existing laws, is as follows: "Nothing in this act shall be construed to punish commissioned medical officers serving in the army or navy of the United States, or in the U. S. marine hospital service, while so commissioned, or any one while actually serving as a member of the resident medical staff of any legally incorporated hospital, or any legally qualified and registered dentist exclusively engaged in practising the art of dentistry, or any lawfully qualified physicians and surgeons residing in other states or counties meeting registered physicians and surgeons of this state in consultation, or any physician or surgeon residing on the border of a neighboring state, and duly authorized under the laws thereof to practise physic or surgery therein, whose practice extends into the limits of this state, providing that such practitioner shall not open an office or appoint a place to meet patients or receive calls within the limits of the state of New York; or physicians duly registered in one county of this state called to attend isolated cases in another county, but not residing or habitually practising therein." The other provisions of the law which are intended to punish all those who fraudulently practise medicine, are also worthy of commendation. We sincerely trust that the whole bill will promptly pass both houses of the legislature and receive the signature of the governor.

CAPT. A. W. GREELY'S appointment as chief signal-officer with rank of brigadier-general is a well-merited promotion. It is also a compromise with those who have been advocating the separation of the service from the army; for, while the new chief is an army officer, he is also a man of scientific attainments and experience, and it was for the purpose of securing a person with the latter qualifications that the change was advocated. The appointment is also applauded by the President's friends as being in strict line of civil-service reform, as Captain Greely was next in rank in the bureau to General Hazen, and had worked long enough with him to understand fully the methods of the service. The general impression seems to be that the senate will confirm the nomination.

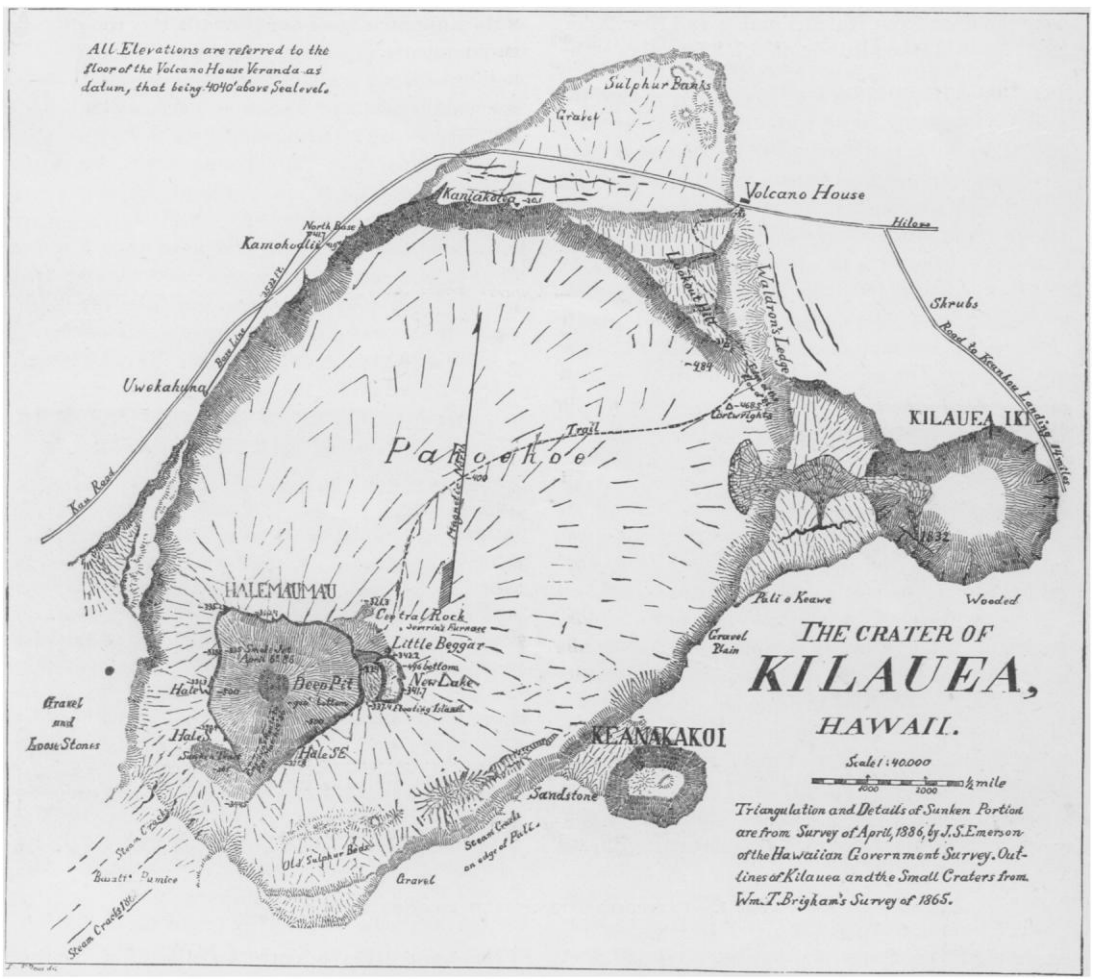
THE LATE ERUPTION FROM KILAUEA.

BECAUSE of the increased numbers of tourists, better facilities are now offered for visiting Kilauea. Instead of the arduous equestrian journey of thirty miles from Hilo, over rough lava, often in the midst of rain, the traveller can now disembark from the Kinau — the best of the inter-island steamers — at Keauhou on the dry side of Hawaii, and reach the Volcano House by a new road, only eighteen miles long, and that mostly in a carriage. Arrangements have been perfected by which the round trip can be taken from Honolulu in six days' time, allowing two nights and one and a half days at the caldera, and at a cost of sixty dollars.

The first recorded eruption from Kilauea was in 1789, when a troop of native soldiers were suffocated. The first scientific accounts are those of Ellis in 1823, and of the U.S. exploring expedition in 1840, as given by Commodore Wilkes and Prof. J. D. Dana. Since then the more notable changes have been recorded by Dr. Titus Coan in the columns of the *American journal of science*. In 1882 Capt. C. E. Dutton explored Kilauea and the Hawaiian Islands generally, presenting in the 'Fourth annual report of the U.S. geological survey' the best description of the volcanic phenomena of that part of the world that has yet appeared. In the following year, and also during the past summer, the writer went over the same ground.

Immediately after the disappearance of the lava in Kilauea in March last, Prof. W. D. Alexander, chief of the trigonometrical survey of the Hawaiian Islands, directed his assistants to make a plan of the disturbed region; and by his kindness we are permitted to present it to the readers of *Science*. The triangulation and details of the sunken portion are from the surveys of J. S. Emerson; the general outlines are from W. T. Brigham's survey of 1865, while the map was drawn by F. S. Dodge. The descriptive lettering is mostly taken from Brigham, with a few additions and improvements: for instance, the names of the small adjoining craters are altered to correspond with Hawaiian usage. The 'Kilauea Iki' of Brigham is changed to 'Keana Kakoi,' and 'Poli-o-keawe' is changed to 'Kilauea Iki.' The designation 'Poli-o-keawe' is applied to the shelf between the large and small calderas. Captain Dutton copied these errors of Brigham into his report.

Commodore Wilkes prepared a map of Kilauea, delineating the main topographical features, and especially showing the 'black ledge,'—a shelf of desiccated lava from 600 to 2,000 feet in width, and about 660 feet below Uwakahuna, the



highest point in the rim on the western side. It encircles a lower pit, 12,000 feet long, 3,000 feet wide, and 384 feet deep, which represents the dimensions of the block of melted lava that broke out twenty-seven miles distant, and then flowed twelve miles to the sea at Nanawali. The black ledge was still discernible in 1865, but has not been mentioned for the past ten years. The southern end of the deep pit represents the centre of activity, called 'Halema'uma'u.' From time to time tem-

porary lakes of fire appear on all sides, but Halema'uma'u remains essentially constant. This is a real crater, while Captain Dutton has well suggested the name of 'caldera' for the entire depression.

The entire pit was never fuller than on the evening of March 6, 1886. The lava that for nine years, or since the last previous important discharge (1877), had been accumulating and pouring over the floor from Halema'uma'u and New Lake, till it attained the altitude of 3,719 feet above the sea-level. The floor was convex, and 160 feet higher at the lakes than at the northern edge, while the general level averaged from 150 to 200 feet above the black ledge of Wilkes. To the south the lava had risen upon the old sulphur-banks, nearly covering them, while leaving a long narrow promontory scarcely a dozen feet above the general level. Late in the evening there commenced a series of earthquakes, so severe as to alarm J. H. Maby, the landlord of the Volcano House, and his household. Up to 8 A.M. of the following day, forty-three shocks were noted, some of them probably occasioned by the falling of large masses of rock. Shortly after midnight the lava disappeared through a subterranean channel, filling up some vacant chamber, probably, since it did not discharge anywhere at the surface, nor was there any oceanic disturbance within easy distance of the island. The thickness of the molten column that disappeared proves to be 570 feet, without estimating the additional distance to the unknown reservoir beneath the rough fallen fragments.

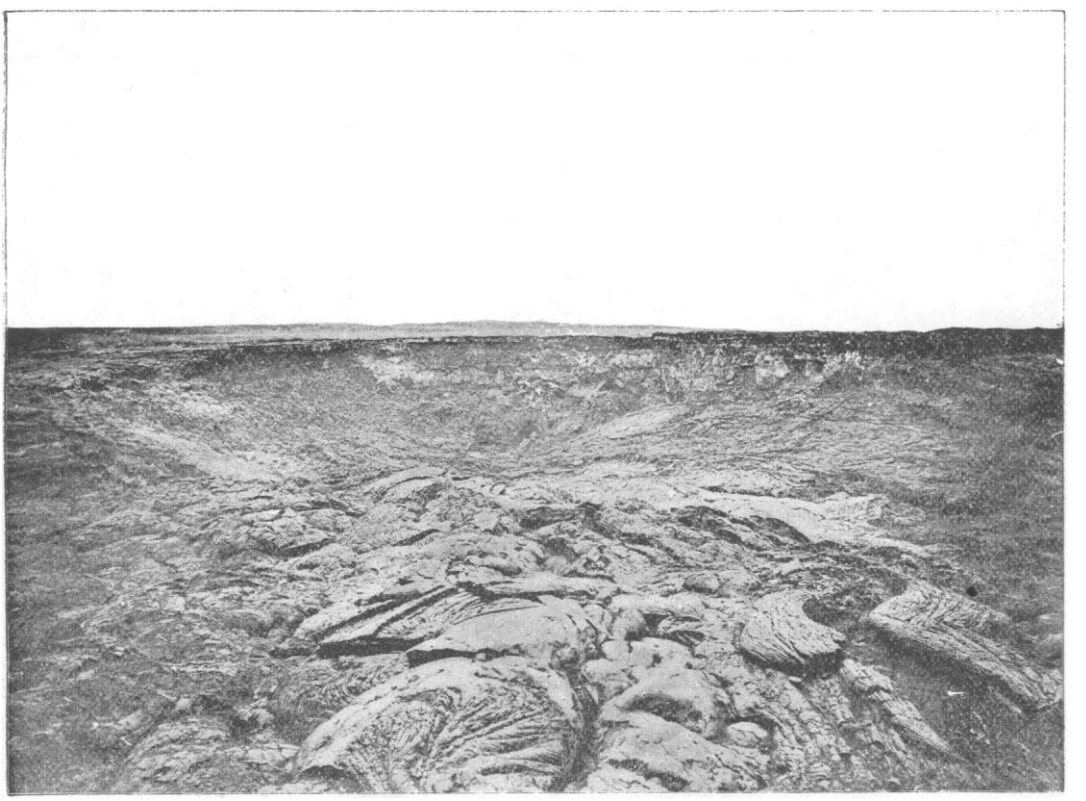


FIG. 1. — CAVITY ONCE OCCUPIED BY THE NEW LAKE.

The map gives a correct delineation of the sunken area. The main depression is roughly triangular, with sides about 3,350 feet long, forming an area less than half a mile square. In extent it is not very unlike Kilauea Iki, though the basin carries less cubical content. To the east of the principal depression is the space left by New Lake and Little Beggar, the smaller temporary craters. The average depth of this circular segment is 165 feet; the length, 1,700 feet; width, 250 to 650 feet. It is a sort of shelf or terrace adjoining the greater depression. The triangular pit

is very irregular, some portions of it equalling the New Lake terrace in altitude, while the deepest part is in the centre. The walls of the depression may now be called the 'black-ledge;' and their limited dimensions, as compared with the greater pit formed in 1840, will illustrate the littleness of the late discharge. Like the last, the next eruption may be expected after the new pit has been refilled.

The accompanying illustrations show the sunken region. The first (fig. 1) shows the space occupied by New Lake. The steep wall was the edge of the molten lava, and the depth 165 feet. In both views the precipitous walls constitute the new black ledge.

The second (fig. 2) shows the pit of Halema'uma'u. The lava reached very nearly to the top of the cliff before the eruption. The general level of the depression is similar to that of the bottom of New Lake, and the central pit is well shown with the steam and sulphurous gases rising from its lowest point. The greatest depth exhibited is 570 feet.

Besides the formation of this pit, there were produced several large cracks in the neighborhood, — one on the Poli-o-keawe, at the sulphur-banks near the Volcano House; and two on the way to Keauhou, two miles distant.

Quietness and darkness reigned in this pit till the fourth day of June. Four days later we visited it, and found upon the east side of the deepest pit a hole about forty feet across, descending at an angle of eighty or eighty-five degrees to a lake of fire. Great volumes of steam and sulphur vapor poured out of this orifice, whose walls were lined with sublimed sulphur and Pele's hair. As the opening lay in the midst of loose blocks of lava and widened out downwards, it was dangerous to stand near the edge; but the swashing of the liquid was distinctly audible, and stones thrown down were heard to splash into the liquid. The depth to the lava was probably about two

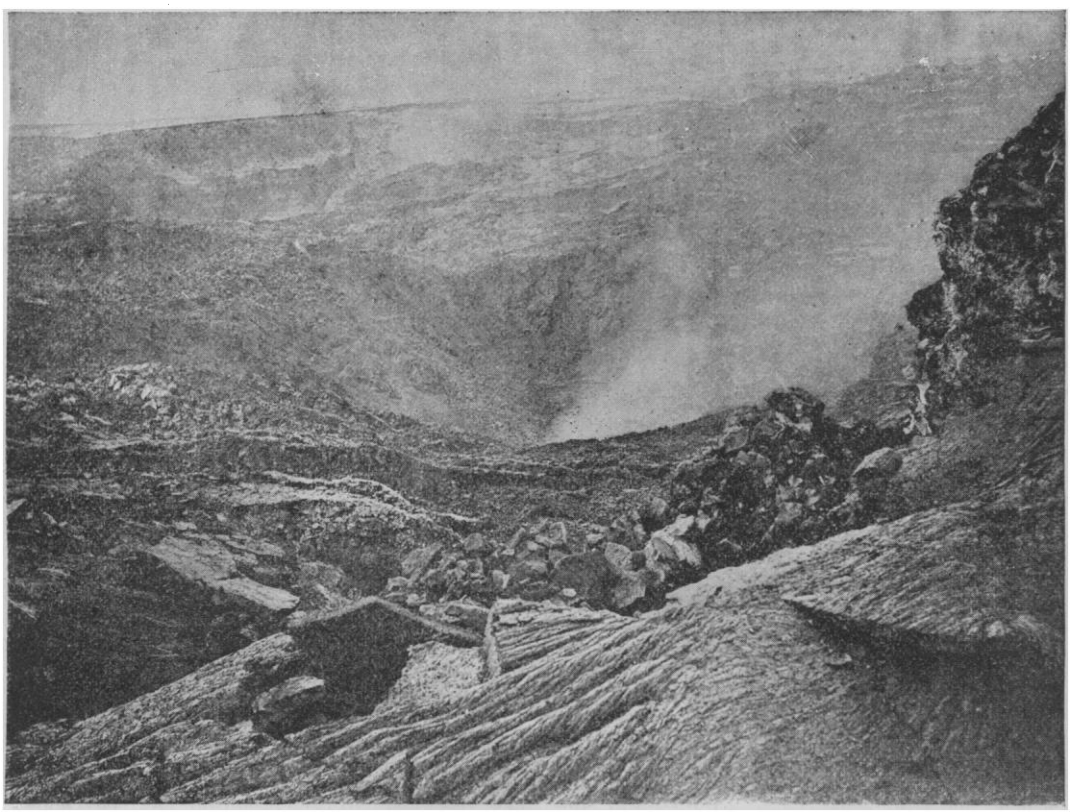


FIG. 2. — HALEMA'UMA'U AFTER THE DISAPPEARANCE OF LAVA IN APRIL, 1886.

hundred feet. To the northward about two hundred feet was a copious discharge of corrosive vapors, which increased in strength in the course of the following week. At night the fire could be seen above the pit, just as at our earlier visits. It was evident the fire had returned to Kilauea; and the drooping spirits of the proprietors, who had made extensive preparations for the entertainment of tourists, began to revive. On the 25th of June a still larger vent opened upon the west side of the deep pit, or rather two of them. Two lakes of fire formed, divided by a very narrow ridge, early at the level of the deepest part of the pit

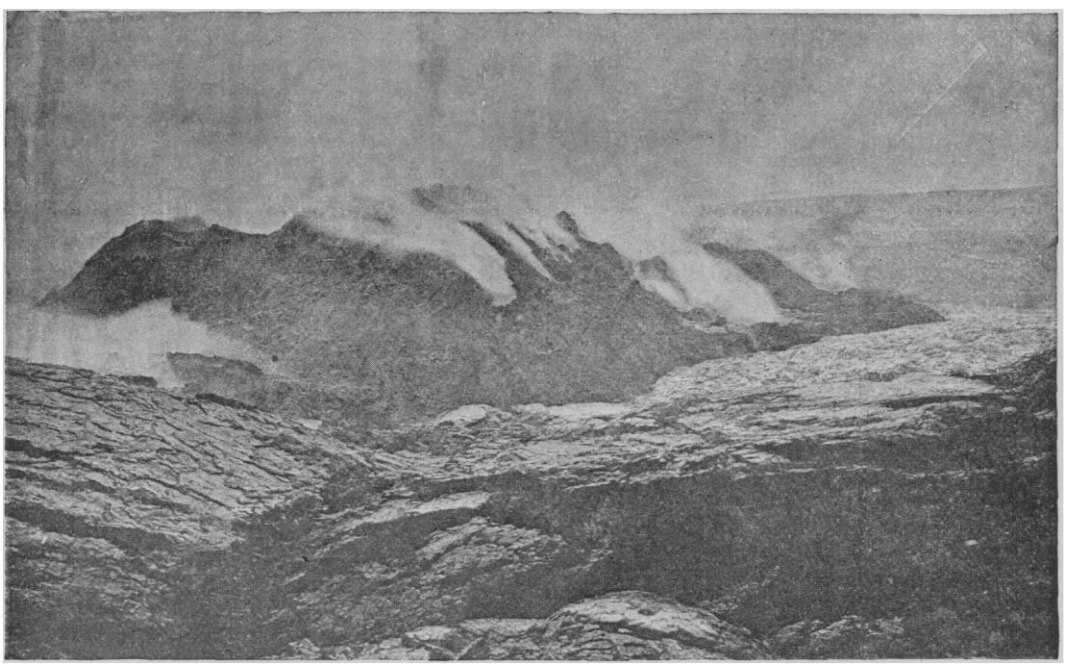


FIG. 3.—THE NEW HALEMA'UMA'U, AS SEEN EARLY IN OCTOBER, 1886.

(at least 800 feet below the Volcano House), and having a length of 700 feet and a width of 400 feet. About the same time the lava flowed out of the small opening of June 4, and is filling up the deep pit. Professor Van Slyke of Oahu college reports that the pit was entirely filled up at the end of July, and that a conical mound is forming above it. This will probably develop into a second Halema'uma'u, occupying, as it does, exactly the same place as the old one. All the discharging vents are situated within the limits of the sunken area of the map.

Advantage was taken of our visit to explore the southern part of the caldera. Standing at Keana Kakoi, one sees to the south-west and south a stretch of volcanic sand and *débris* fully equal in dimensions to Kilauea itself. On examining more closely the material called 'sandstone' and 'gravel' upon the map, it was seen to consist of material ejected from the volcano, and numerous lava-bombs were picked up. Ashes also cover the country to the south and south-west over the Kau desert for several miles. The conclusion is therefore forced upon us that the earlier eruptions varied in character from any thing that has been observed during the last half-century. Ashes, sand, and stones were thrown to a distance of several miles from the volcano; so that the Vesuvian type of action has been sometimes exemplified here.[1] It was in the neighborhood of the Keana Kakoi that the army was suffocated in 1789, perhaps by the very eruption whose *débris* are now strewed over the surface, and it may have come possibly from Keana itself.

It is not generally known that in 1868 the lava of Kilauea discharged from a vent in the Kau desert seven or eight miles distant. It has been claimed by some that the flow at Kahuku in that

[1] Observations made in the sugar-plantation districts of all the islands suggest that the subsoil is probably derived from these aerial discharges rather than from the decompostion of lava or from a deposit beneath the ocean, as suggested by Captain Dutton.

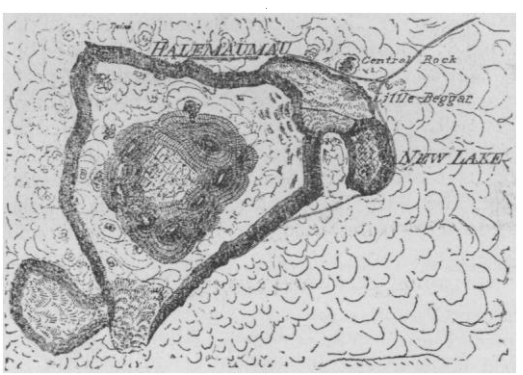
year came from Kilauea. The best authorities, like Dutton, agree that the Kahuku flow came from Mauna Loa, while Kilauea overflowed in the Kau desert. The area of the flow is only about a quarter of a mile in length and breadth.

It is worthy of note that after the eruptions of 1823, 1840, and 1886, the returning lava has stood at nearly the same level. That of 1823, described by Ellis, is estimated by Dutton to have been 400 feet lower than at the time of his visit. Reducing the figures to a uniform standard reference to the sea-level, the altitude in 1823 was 3,177 feet; in 1840, 3,170 feet; in 1886, 3,140 feet, or the lowest point. In 1882 the level of New Lake was estimated at 3,577 feet. The highest level of March 6 was at 3,719 feet. It appears, therefore, that there has been no essential change in the normal natural level of the molten lava for the past sixty-five years.

By advices sent as late as the middle of October, it appears that the central cone has risen 700 or 800 feet above the lowest level of the pit, and it is still rising. Small streams of lava issue, play around, and harden between the central cone and the walls of the pit; so that the old Halema'uma'u is being restored (fig. 3).

During the months of September and October Professor Alexander employed parties to make a further survey and map of the great caldera. The result is given in the annexed map after the surveys of F. S. Dodge. The earlier map of Emerson was based upon the sketch of W. T. Brigham, made in 1866, and any general changes of outline observed are due to the greater precision of Dodge's survey. One observes differences in the northern wall, the straightening of the cliff in front of Kilauea-Iki, the more satisfactory representation of the two side-craters, and the location of the promontory at the old sulphur-beds. Halema'uma'u itself shows changes between these two latest maps. Instead of the deep pit in the centres 900 feet below the Volcano House, there is a circular ridge nearly 600 feet above that lowest point. The lava which commenced to flow June 4 has continued to discharge ever since, and has now built up this crater. There is a sort of moat between the crater and the black ledge surrounding it as well as the central pit within. There is represented also an interesting patch of Aa to the north of Halema'uma'u.

C. H. HITCHCOCK.



HALEMA'UMA'U IN OCTOBER, 1886.

PARIS LETTER.

IN a paper recently read before the Biological society of Paris, Dr. Debierre gave the results of researches concerning the physical superiority of the right side of the human body. Since the experiments of Harting, Sappey, Jobert, Concet, Milne-Edwards, and others, it has been generally accepted that in right-handed persons the right side is larger, longer, and heavier than the left side. To ascertain whether this disparity exists in early life, or is afterwards developed by education, Dr. Debierre experimented upon the dead bodies of young children, and found that, where education and practice had not interfered, there was no difference in size or weight between the right and left limbs. This is well, so far as it goes, but there must be some reason for the superior development by education of the right side. Even if we admit that education is the only reason for this superiority, we must believe that some circumstances in the foetal development, or in the conditions governing the nervous centres, are favorable to it, as it is so general, unless we believe that the first man was by special design created right-handed. But this belief I think no naturalist would accept.

As a consequence of the troubled international relations on our continent, — a state of affairs prejudicial to thought and business alike, and which will end some day in a tremendous crash and most foolish and unprofitable waste of human energy and life, — chemists are busily engaged in seeking improved methods of destruction. In France a new explosive has been devised, said to be as much superior to nitro-glycerine as the latter is to common gunpowder. It is called 'melinite,' and its explosive force is to that of gunpowder as 100 to 5. Its destructive effects are fearful, inasmuch as bombs charged with it do not explode immediately upon striking a wall, or similar resisting surface, the explosion taking place some little time after penetration. This new war material is the invention of MM. Locard and Hirondard of Bourges, to whom the minister of war has given an order for 200,000 bombs charged with