to my absence from home, I was unable to visit the place until Oct. 17, four days after the skull had been found. During this visit, I made a careful study of the peat formation and the underlying blue clay, which I take to be the bowlder clay covering the bottom of the basin or old pond, which is some four or five acres in area. Over this blue clay, containing both rounded and split stones, the deposit of peat has taken place. The two skulls, mastodon and human, were unquestionably at the bottom of this peat, both resting on the blue clay; but, owing to the inclination of the basin toward the northeast from the spot where the human skull was found, there were two feet less of peat over the skull than there were over the mastodon. The stratification of the peat was quite marked, and the lower portion immediately covering the two skulls is very fine, and evidently a deposit made entirely under water. Above this the peat is slightly coarser, which character increases to the surface. While a few small pieces of wood were found at the bottom of the peat, several large logs, and what seems to be the remains of a partially burnt stump, were found in the layer about two feet above the human skull. To this depth heavy objects could have readily sunk through the coarse or more open formation above, but I question the possibility of so light an object as a human skull sinking through the lower two feet to the hard pan at any time subsequent to the formation of that stratum. That both skulls were transported, seems to be proved by the fact that no other bones of the two skeletons were found in the immediate vicinity; and that they were transported by water before the peat deposit began, seems probable. The broken portions of the human skull have the appearance of having been worn by water action, and the dissociation of the jaw and cranium would also indicate that method of removal from the rest of the skeleton. Had it been a settling of a heavy body through the peat, we could hardly expect that the skull and jaw alone would have settled to hard pan, and the rest of the bones of the skeleton to have been nowhere near them; and the same remark would apply to the skull of the mastodon.

The skull has been placed in my hands for careful study and comparison, and I hope soon to be able to give definite information in regard to it. Unfortunately, the skull is not a typical one, and the averaging and careful balancing of its characters will have to be made before its race affinities can be determined. In regard to its color, I may add that it is as deep, if not deeper brown, than the bones of the mastodon. Its comparatively perfect preservation when compared with the mastodon skull is, however, remarkable; but this could be easily accounted for by the longer exposure of the mastodon bones on the surface of a gravel deposit before being washed into the basin.

F. W. Putnam.

THE INTERNATIONAL GEOLOGICAL CONGRESS AT BERLIN.

The third and most important session of the International geological congress, which was instituted by an American committee of the American association at its Buffalo meeting in 1876, has just been held.

The first session at Paris in 1878 was really a *pour parler* which broke ground. The next session at Bologna in 1881 accomplished something, but was especially useful in preparing for the work of the session just closed by deciding to produce a geological map of Europe on a scale of 1: 1,500,000 and intrusting its execution to one committee, while another was appointed to devise some scheme for unifying the nomenclature, and, where possible, of fixing the limits of various congeries of beds, which had heretofore been differently understood by different geologists. The obstacles which faced these committees will be at once understood from this bare statement, and will modify any hasty impression that in fact very little has been accomplished.

The two committees, or a majority of members of each, met at Foix and at Zurich during the four years which intervened between the congresses of Bologna and Berlin, and the action of the congress which has just ended was almost exclusively confined to the propositions made in the printed reports of these committees.

Those who arrived in Berlin some days before the opening of the congress found at the superb Bergakademie on the Invaliden strasse the bureau organized to examine the credentials of delegates, and provide each with the necessary card and receipt for the ten marks he paid, besides a medal in silver, bearing the inscription on one side, 'Geologorum conventus, mente et malleo,' with the conventional mallet and chisel crossed, and surrounded by a wreath of oak. On the other side, within a similar wreath, were the words, 'Berlin, 1885.' The medal was suspended by a white satin ribbon, and worn on the lapel of the coat for identification on excursions, etc.

A programme of the order of events may be thus condensed: Monday, September 28, at 10 A.M., meeting of the council at the Reichstagsgebäude; 5 P.M., social re-union of the members of the congress in the ante-chamber of the palace. Tuesday, September 29, 9 A.M., opening of the congress; 2 P.M., visit to the Bergakademie to see

the collections and the objects sent to the congress. Wednesday, Thursday, Friday, and Saturday, sitting of the congress at 2 P.M.; 7 P.M., Saturday, close of the congress. Sunday, 9 A.M., excursion to Potsdam. Then followed announcements of the excursions to the Hartz, to Stassfurt, etc. This programme was followed in the main, only an extra session of the congress being intercalated. The usual course was to devote two hours to the discussion of the committees' reports (2 to 4 P.M.), and the last two hours (4 to 6 P.M.) to scientific discourses of various delegates.

The weather during the entire week was very disagreeable, cold and rainy. On Sunday morning, after the close of the congress, it promised to be fair, but only to deceive the hopes of those who took part in the Potsdam excursion. The commencement of the trip was very beautiful, but towards the close it degenerated into a procession of dripping and shivering people, who tried to look as if it were pleasant in order not to offend their kind hosts.

The language of the congress had been decided upon as French; and this, no doubt, accounts for the greater share taken by the Swiss, Belgians, and French in the debates, than by the people of other nationalities. The Germans, for instance, who outnumbered all other nationalities taken together, had only one representative, who managed the language with fluency, and led in debate, —Hauchecorne, the active spirit of the congress. It is true that Neumayr (an Austrian) did retort very effectively once to M. Lapparent, and his Excellency v. Dechen spoke frequently, if not easily; but Dr. Beyrich, the nominal president, was entirely unintelligible, and Stur was obliged to get a dispensation from the congress and speak in German.

On Tuesday evening at 6 P.M. the first report was given by M. Renevier of Switzerland, the secretary of the committee appointed to prepare the European map, which was thus constituted: Beyrich and Hauchecorne (forming the sub-committee of direction in Berlin), Germany; Daubrée, France; Giordano, Italy; de Moeller, Russia; Mojsisovics, Austria-Hungary; Topley, Great-Britain; Renevier (secretary general), Switzerland. The committee of direction had made an arrangement with D. Reimer & Co., of Berlin, according to which this firm agreed to undertake the publication of the map at its own risk, provided the committee would guarantee them an edition of 900 copies, at 100 francs a copy, and would give them sums on account in advance.

The map is to consist of 49 sheets, 7 in breadth and 7 in height. Each of these sheets is 48x53 cm., and the whole of them together will form a chart 3.36 metres high and 3.72 metres broad. Prof. Kiepert of Berlin is to prepare the topographic base, using for this purpose all data at his disposition, both published and unpublished. Great Britain, France, Spain, Italy, Austro-Hungary, Germany, Scandinavia, and Russia, each takes 100 copies. The remaining 100 copies are to be divided between the six smaller states, Belgium, Holland, Denmark, Switzerland, Portugal, and Roumania. The central committee is to receive from each national committee the map of its country, and to make them harmonize.

The report ended with the following six resolutions, which the committee asked the congress to pass:—

1°. M. Karpinski will succeed M. de Moeller (resigned) in representing Russia on the committee.

2°. The carbonic system (or Permo-carboniferous) shall be represented on the map by three distinct shades of gray.

3°. Brown shades will be applied to the 'Devonic.'

4°. The color to represent the 'Siluric' is left to the discretion of the committee.

5°. The eruptive rocks shall be represented by seven tints, ranging from bright red to dark brownish red.

6°. The determination of the other questions mentioned in the report shall be left to the discretion of the committee.[1]

Proposition 1° was adopted without dissent. Proposition 2°, after much opposition, was agreed to, with the understanding that the proposed method of the committee should not be understood to have any bearing on the scientific settlement of the question, but should be regarded purely as a provisional expedient adopted in order to complete the map. Proposition 3° was agreed to. Proposition 4°, after strong opposition from Prof. Hughes and M. Jacquot, was finally so modified as to allow the committee to adopt it provisionally for the purposes of the map, without prejudging the abstract scientific question at all, and thus carried. Propositions 5° and 6° were carried without objection.

Sept. 30, at 2.30 P.M., the congress re-assembled to take action on the report of the committee on the unification of nomenclature, which was then presented by M. Dewalque. This report had been in the main adopted at the Bologna congress, a few minor

[1] The questions here referred to comprise several matters about which the committee was in doubt: e.g., (*a*) How are the terranes to be represented, of which the subdivisions were doubtful? (*b*) How are those subdivisions to be indicated which are too small to appear on the scale of 1:1,500,000 adopted for the map? (*c*) How are measures to be represented when even their age is doubtful? (*d*) How represent subdivisions concerning the affiliations of which geologists differ (Gault, Rhetic, etc.)?

points having been left for future adjustment. They concerned, for the most part, definitions of terms, such as 'group,' which it was determined should be applied to the divisions of the highest order (secondary group, etc.); the next division should be 'systems' (Devonian system, etc.); the third should be 'series' (coal-measures series of the carboniferous system); the fourth division should be 'stages' (*étages*) (millstone grit, etc.); the division of the fifth order was decided upon (for French only) as 'assise' or 'couches;' 'zone' should be used for a number of beds having one or more fossils to characterize them, but it should be inferior to 'stage' as a term of classification. 'Bank' was selected to imply a bed (*couche* or *assise*) thicker or more coherent than those in its vicinity, among which it is intercalated. These, and certain conclusions as to the application of the terminations 'ary', 'ic', and 'ian,'—the first for the groups, the second for the series, and the third for the stages,— completed the linguistic portion of the report. No termination for systems was proposed.

It was decided to give to the pre-palæozoic rocks the name 'archæan' instead of 'primitive,' and, while recognizing three divisions of them, to allow each geologist to distinguish these by petrographic characters.

On the motion of Prof. Archibald Geikie, the decision as to the limits of the Silurian and Cambrian is left till the meeting of the congress in London in 1888, but the committee on the chart has liberty to divide the lower system of the palæozoic group into three parts, of which the names shall be determined upon later.

After a long and exciting discussion, the propositions were accepted: (*a*) that the Devonian should be divided into three parts, corresponding respectively with those termed the Rhenan, the Eifelian, and the Famennian; (*b*) that the calceola beds should form part of the Eifelian; (*c*) "that the upper limit of the Devonian should be drawn at the base of the carboniferous limestone, that is to say, the system which includes the Psammites of Coudroz, and the upper Old Red." [The words "the lower carboniferous (Kilborkan, Marwood, Pilton)," and "or the calciferous sandstone Dura, Den," were stricken out of the committee's resolution, at the request of Prof. A. Geikie, as not representing the real association of these beds.] The whole paragraph (*c*) was afterward suppressed.

The question of associating the Permian with the carboniferous provoked the most interesting discussion of the congress. Stur of Vienna, Lapparent, Blanford, and Prof. Newberry, spoke in favor of such union. Hughes, Topley, Nikitin, and a great many others spoke against it. Prof. Newberry, in the course of his remarks, said that "his honored colleague, Prof. Hall, was of the opinion that the Permian did not exist in America, and that his own studies confirmed this view."

M. Neumayr thought "the decision of such questions as this should not depend upon a majority vote which would change in each country, and after each eloquent speaker" (referring to Mr. Lapparent's brilliant defence of the committee's proposition). This view was finally taken, and the congress adopted, with about fifteen dissenting votes, the following proposition formulated by Mr. Dewalque:—

"The congress, not wishing to pronounce an opinion on the scientific question, will leave the classification as it is."

After much debate, the threefold division of the triassic was agreed to, but without assigning any names. The division of the system into three was adopted, but without specifying the names of the divisions. It was agreed that each geologist might draw the upper horizon of the lias where he thought best. It was agreed that the 'Gault' should be joined to the cretaceous. The divergence of views on this subject was so great that M. Capellini, then in the chair, cut short the whole question by asking for a vote of confidence in the committee, which was unanimously given.

Finally the sevenfold division of the eruptive rocks in as many tints of red was carried without opposition.

This completed the serious geological work of the congress, and it was then agreed to meet in London in 1888. A committee, consisting of Hughes, Geikie, Blanford, and Topley, was appointed to make the necessary arrangements, and the congress adjourned.

During the course of the congress, addresses were given by Messrs. Gaudry on certain reptiles; Newberry, on a new large Devonian fish from America; Posepny, on the fluid condition of the earth's interior; Ochsenius (in German), on the origin of salt deposits; Neumayr, on the plan for the 'Nomenclator palæontologicus' which he is compiling (and which the congress voted to publish under its auspices, and through the agency of a special committee consisting of MM. Gaudry, Zittel, and Neumayr, and one other whose name escaped the writer). M. Nikitin presented his map of middle and south-eastern Russia, including the valley of the Volga; M. Vasseur exhibited 13 sheets of the map of France; and Dr. Frazer (on behalf of Mr. McGee) presented an explanation of the methods employed by the director of the U. S. geological survey.

The delegation which represented the United States at the congress consisted of Prof. James

Hall and Prof. J. S. Newberry, members of the original committee which suggested the congress; Prof. H. S. Williams, and Prof. Persifor Frazer, who were elected by the American association for the advancement of science at its Ann Arbor meeting. These four constituted the American committee selected by the A. A. A. S. Besides these, Prof. Brush was elected by this committee under the powers vested in it. Mr. J. F. Kemp (asst. to Prof. Newberry), Mr. H. B. Patton (student), and Mr. H. E. Miller (chemist), from America, also appeared on the roll of the congress. Mr. McGee, representing Major Powell and the U. S. geological survey, arrived after the session had commenced.

In all, 255 members were in attendance, of which 163 were from Germany, and the rest mainly divided between Italy (18), Austria-Hungary (16), Great Britain (11), France (10), United States (9), and Belgium and Russia (6 each).

A detailed report of the committee, giving the debates in part, has already been completed.

LOCALIZATION OF FUNCTIONS IN THE BRAIN.

HAPPY those who in the rapid revolutionizing of brain-physiology, which the last few years have brought about, have kept abreast of the current. For the new publications are so minute and rapid that, once left behind, there is no hope of catching up. The vivisectional results of Goltz, Ferrier, Munk, Luciani, and a host of others, with the rather rough polemics which have characterized the German writings on the subject, must have given to many the impression of an almost desperate field where no two experimenters could agree as to the facts, and no one, not himself an experimenter, could critically judge of the relative merits of the investigations published. The researches of Munk in particular, professor at the veterinary school in Berlin, seemed to be on such a vast scale, had such an imposing clearness, were set forth with such an air of *überlegenheit* over all comers, and above all presented such an exact correspondence of facts with theoretical requirements, that it was hard to know just what to think of them. Everyone's else researches sounded clumsy and immature in comparison. And yet their very absoluteness awakened suspicion. Munk seemed too clever, his neatness more French than German. Nature does not often yield so exactly balanced a sheet of accounts with our laboratories, especially those of physiology. Results are apt to be more conflicting, and vary more from one *versuchsthier* to another. And so in spite of Munk's apparent superiority, many lookers-on have secretly felt as if the ruder style of Goltz and others, and their vaguer conclusions, would prove to be more in the line of final truth.

Professor Christiani's little book strongly helps to corroborate this view. Munk is a strict localizer of functions. By his extirpations in dog's brains he thought he had mapped out the exact part of each occipital lobe which presides over the sensibility of each part of the retinal surface. He said that blindness, sensorial and intellectual, total and irreparable, follows complete ablation of these lobes; and when Herr Christiani in one of the memoirs republished in this volume, announced his observation that rabbits from which the cerebral hemispheres were entirely removed, would, nevertheless, steer clear of obstacles in their path as they loped about the room, Munk came down upon him with a tone so much resembling divine retribution that all bystanders must have thought it impossible for the younger investigator ever to show his face again. But this was reckoning without the resources of experimental physiology. Professor Christiani comes up smiling in the pages before us, and, we think, shows himself decidedly the better man of the two. Not only does it appear from Munk's subsequent confession that his first would-be repetitions of Christiani's experiments on rabbits were injudiciously performed, but we think we also see a decided obstinacy and lack of candor in Herr Munk's refusal to admit the injudiciousness. As well as a mere reader can judge, Christiani seems to have really proved that the avoidance of obstacles during locomotion is in rabbits a function which may be performed by the aid of visual centres *below* the hemispheres of the brain; in other words, that his rabbits were not really blind.

The latter half of the book is occupied by an historical survey of the localization of the function of vision, a survey of which the evident purpose is to show by a cumulation of evidence, how one-sided Herr Munk's observations, and how absolute his inferences, have been. This survey is to be recommended to all who would like to review this interesting chapter of physiology. It leaves naught to be desired in the way of learning, and its polemic tone is courteous. It shows an amount of evidence against any *exclusive* connection of vision with the occipital lobes, which, to our mind, is quite overwhelming when brought together in this way. It suggests, as Goltz does, that much of the blindness resulting from lesion of the occipital lobes may be due to an *interference* with lower visual centres spreading from the irritation of the wound. But, though breaking down

Zur physiologie des gehirns. By ARTHUR CHRISTIANI. Berlin, *Enslin*, 1885. 10+175 p., 2 pl. 8°.