parts may be distinguished, — one vertical, descending from the blastopore; the other horizontal, running forwards. In the dorsal wall of the latter, the chorda dorsalis makes its first appearance. The canal closes at the same time as the medullary tube. Just before the closure of the blastopore, the 'anlage' of the medullary cord extends around it. After the external closure, the communication between the medullary tube and the digestive cavity is still maintained by the canal. Strahl uses the unfortunate term 'medullary cord' to designate the medullary tube, notochord, and part of the primitive streak together: hence he describes the chorda as being differentiated from the medullary cord. This only adds to the confusion, and is the more to be regretted, since the real origin as described by him agrees with the accounts of other writers, — it is at first a modification of the epithelium of the neurenteric canal. The middle portion of the chorda is the first to be grown over by the entoderm: therefore the two ends remain longer uncovered than the middle. At the time when the peripheral mesoderm, forming the area vasculosa, reaches the germ-wall, the latter is already completely fissured. Blood-vessels have begun to appear before this time, and without the participation of the germ-wall. C. S. MINOT.

THE INTERNATIONAL GEOLOGICAL CONGRESS.

THE compte rendu of the second session of this congress, held at Bologna last year, has just appeared in a thick octavo, with abundant illustrations. The history of the congress, forming the first part of the volume, was prepared by the president, Capellini, and consists of a brief account of its origin with the meeting of the American association for the advancement of science in 1876, a summary of the results of the first meeting at Paris in 1878, a list of the members and officers of the first congress, an account of the choice of Bologna as the rendezvous for the second meeting, of the nomination of the international commissions, of the organization of the second congress, with its rules and regulations, and lists of the members, delegates, and officers. In connection with this latter portion, it is curious to note that a number of the more eminent geologists who originally took part in it no longer belong to the congress; and also that the number of Italians at the congress was 202, although the geological society of Italy has only 120 members, of whom 14 are foreigners.

The second part, prepared by Delaire and Fontannes, besides the proceedings at the different sittings, contains a number of appendices on geological coloring and nomenclature, and one on the classification of mineral masses by M. de Chancourtois, accompanied by a tabular view of lithological synthesis. This author objects to the indiscriminate use of the word 'rock,' and proposes instead the word 'lithe,' which he subdivides, according to the origin of the rock, into analithes, endo-analithes or endolithes, exo-analithes or exolithes, catalithes, peri-catalithes or perilithes, apo-catalithes or apolithes. The reports of the discussion are interesting, as showing the extreme difficulty of reaching any unity in classifications, even on the most trifling points.

The third part (documents of the congress, prepared by the same hands) contains a brief description of the collections and maps exhibited at the congress. Among these may be mentioned the geological map of Italy (scale, $\frac{1}{1,111,111}$), engraved in the colors of the international commission, especially for the congress, in two editions, — one with the mountains figured in hachures, and the other without them. The latter is the clearer, and preferable as a geological map. It is curious that a map on a scale so small should have twelve colors devoted to crystalline rocks, and only ten to the sedimentary strata; and it answers well its purpose as a study of geological map-coloring. The Italian committee also prepared a geological and paleontological bibliography of Italy, containing mention of 6,566 memoirs from the days of Aelianus (693 B.C.) to 1881. Its arrangement is remarkably clear and simple.

The fourth part (annexes) contains *in extenso*, and in their original language, the reports sent by the national committees to the international commissions established in 1878. They are followed by summaries of a few individual reports on the unification of nomenclature, or of graphic processes.

The scientific communications are the following: 1°. Macrographical classification of the trachytes of Hungary, by J. Szabó, already mentioned in SCIENCE. 2°. On the classification of the ancient stratified rocks of the island of Sardinia, by J. G. Bornemann, who has found a number of primordial fossils, paradoxides, etc., with intercalation of the second fauna. This would seem to be analogous to the condition of the Taconic of Vermont. 3°. On the cretaceous system and the great sand-dunes of the northern Sahara, by G. Roland. He considers the cretaceous as consisting of the middle and upper divisions; that the sand-dunes constitute distinct chains, formed entirely by the wind, and depending for their orography on topographical accidents; that the larger dunes are not moved by the action of the wind, the position of the masses, and the orography of the chains, varying but little, excepting that, as a mass, they are very slowly travelling toward the south-east, and the quantity of sand is continually increasing. 4°. Memoir on the geology of New South Wales, by C. S. Wilkinson, who recognizes all the great divisions, from the Silurian to the tertiary inclusive, and confirms the truth of the report of the late Rev. W. B. Clarke of the association of triassic plants with the marine carboniferous fauna.

Next follows an account of the three excursions taken by the congress to Florence, Pisa, and Carrara. Accompanying the latter is a section from Carrara to the central region of the Alpi Apuane, in which the Carrara marbles are shown to be of triassic age; fossils of this age being found in, above, and below them.

We next have the prize memoirs on the unification of graphic processes in geological maps. The best was considered to be that by A. Heim; next comes the one by A. Karpinsky, and, lastly, that by M. Maillard. Mr. Heim's memoir contains a plate exhibiting the application of his system to profile sections, which is very clear and plain.

The last or fourth part contains numerous reports on geological nomenclature and coloring of more or less importance. It does not seem to have occurred to the congress to compare the different methods in actual use by the different geological surveys. None of the different reports seems to give these, except that by Major J. W. Powell of the U. S. geological survey. The difficulty, with our still imperfect knowledge of geology, of establishing any system of universal application, seems very great, and is well illustrated by Professor Hébert when he expressed the ingenious wish that votes should only be taken on those points on which all are agreed.

In conclusion, we may mention the very sensible motion of Mr. Torel, that the congress, while leav-

ing to the organization committee of each session the care of detailing its programme, desires that in future a place should be reserved for purely scientific studies, besides the works of unification; and also wishes, that, following the example given at Bologna. an exhibition of collections and maps should accompany each session of the congress. J. B. MARCOU.

DEVELOPMENT OF THE MEMBRANE-BONES OF THE SKULL OF THE PIKE.

IN an inaugural dissertation presented to the faculty of the university of Jena, which has been published separately, and also in the *Jenaische zeitschrift* (xvi. 59–87, 1882),[1] with two excellent plates, Johannes Walther discusses this subject very ably, and reaches the following conclusions, which are probably of considerable importance as leading to important general views respecting the development of the membrane-bones of the skulls of Teleostei.

The skull of the pike (Esox lucius) consists of membrane and cartilage bones. The former develop in the following ways: 1. As cementum-bones, by the coalescence of osseous cementum-plates developed below the bases of the teeth, which are formed in invaginations of the oral mucous membrane; 2. As membrane-bones in the subcutaneous connective tissue, independently of any antecedent development of teeth; 3. As perichondrial bones, like the last, but in a deeper layer in contact with the perichondrium. These three modes of development of the parts of the osseous skull are connected together by transitional modes. According to a fundamental biological law, as well as in view of the evidence afforded by the studies of O. Hertwig in the comparative embryology and anatomy of the scales, dermal scutes, etc., of fishes, the preceding types of osteogenesis constitute a series of stages which correspond to the phylogenetic mode of evolution of the bones in question.

The cartilage-bones of the pike's skull develop outwards from the perichondrium, though there is a centripetal growth of osseous tissue during which the cartilage is absorbed. The origin of bone-corpuscles inside of cartilage, or enchondrally, was not observed in any of the stages investigated. The vomer, palatine, and dentary bones are conspicuous instances of the first-mentioned mode of ectosteal development from the fusion of basal, osseous, tooth-supporting plates, which the author regards as representing the cementum. The maxillary, jugal, frontal, nasal, parietal, and parasphenoid bones, although not ontogenetically developed in this way, are true membrane-bones, and are derivable primarily or phylogenetically from coalesced basal dentary plates.

The author finds an enamel cap surmounting the conical hollow dentinal bodies of the teeth which contain the pulp. The conical dentinal cap is the first part of the tooth to be formed; the enamelled tip is then developed previous to the anchylosis of the whole to the osseous basal plate, the dentine growing downwards to meet the latter.

The paper also contains observations on the development of the teeth of the young trout, California salmon, common salmon of Germany, and the eel. The morphology of the skull of Esox is very fully and admirably treated, the histological details and crania of the larval stages figured and described constituting a real addition to our knowledge.

J. A. RYDER.

[1] See also SCIENCE, ¶ 738.

LETTERS TO THE EDITOR.

Rainbow.

LAST evening I observed what to me was a new phenomenon. The day had been clear. Towards sunset the sky clouded in the west with rain-clouds, so that the sun appeared through them only as a white spot of light. The clouds were continuous, but uniformly lighter from the horizon upwards. At quarter of seven o'clock a rainbow, faint, but still distinct in form and color, was visible above and to the northern side of the sun. It extended, perhaps, something less than two-thirds of the way from the horizon in the north to that in the south. The phenomenon is of course easily understood, but is it common?

W. J. L.

Andover, N.H., May 15, 1883.

Nemestrinidae.

In the notice of Handlirsch's discoveries as to the life-history of Hirmoneura obscura (SCIENCE, p. 332), I stated (following Osten Sacken's catalogue) that Hirmoneura was the only genus of Nemestrinidae in the United States. Dr. Williston kindly reminds me that I overlooked his description of Rhynchocephalus Sackeni from Washington Territory, published in 1880 (*Trans. Conn. acad.*, iv. 243). He now publishes (*Canadian ent.*, April, 1883) a paper on the North-American species of that family, in which he describes from my collection a third species; viz., Rhynchocephalus volaticus from Florida. While speaking of this dipterous family, I would also mention that Baron Osten Sacken (*Wiener ent. zeit.*, ii. 114) calls attention to a short communication by E. L. Arribalzaga, published in *El naturalista Argentino*, i. 275 (1878), on the life-history of Hirmoneura exotica Wied., which oviposits in the galleries of a carpenter-bee (Xylocopa augustii St. Farg.). This last constructs its cells in fence-posts and in the wood-work of buildings. Nothing further is stated by Arribalzaga; but the young larvae doubtless leave the burrows, and otherwise resemble those of H. obscura.

C. V. RILEY.

Intelligence of the crow.

In SCIENCE, Nos. 13 and 16, are letters bearing this title, in the former of which the writer refers to crows assaulting him while walking in Rome by attempting to drop stones upon him as they circled above. The author of the second letter takes exceptions to the statement, especially to that part of it averring that the crows dropped the stones *from their claws*, and thinks the narrator must have been 'mistaken in the bird,' basing his belief on his own experience with crows and ravens in confinement, which he has observed always to use their *bills* in transporting objects. Whatever the crows may 'do in Rome,' it is well attested that rooks (Corvus frugilegus), which are true crows, have been seen to carry mussels from the beach to a considerable distance into the air, and let them fall among stones to break the shells, so as to get at the contents. Gulls are well known to occasionally resort to the same practice. Although in neither case do the accounts I have seen state explicitly how the mussels are carried, the inference is that they are taken in the bill. Yet as woodcocks have been seen to transport their young by flying with them supported between the feet, it is obviously unsafe to dogmatize as to what a given species of bird may or may not be able to do.

J. A. ALLEN.