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.