SOME RECENT AMERICAN PAPERS IN COMPARATIVE ANATOMY.

Marsh, O. C.—The limbs of *Sauranodon*, with notice of a new species. *American Journal of Science*, Feb. 1880, pp, 169–171 ; 1 figure.

Morse, E. S.—On the Identity of the Ascending Process of the Astragalus in Birds with the Intermedium. Anniversary Memoirs of the Boston Society of Natural History, 1880 ; pp. 10, 1 plate, 12 figures.

Chapman, H. C.—The Placenta and Generative Apparatus of the Elephant. Journal of the Academy of Natural Sciences of Philadelphia, VIII, 1880. 4 plates, 1 figure, 11 pages.

Chapman, H. C.—On the structure of the Orang Outang. Proceedings of the Academy of Natural Sciences, 1880. 16 pages, 7 plates.

Among the many surprises which science owes to the paleontological discoveries of Professor Marsh, few are more notable than the condition of the limbs in *Sauranodon*. In the present paper Professor Marsh describes the limbs with some detail, and gives a figure of the left hind paddle of *S. discus*. In each limb the proximal segment consists of a single bone which undoubtedly represents the humerus or femur. The following four segments consist respectively of three, four, five and six approximately discoid pieces, which are interpreted as representing the bones of the antebrachium or crus, the two rows of the carpalia or tarsalia, and the metacarpalia or metatarsalia of the ordinary vertebrate limb.

Regarding the carpalia or tarsalia as constituting a single segment, Professor Marsh suggests the following general names for the corresponding segments in the two limbs : propodial, epipodial, mesopodial, metapodial, and phalangial ; since the latter two terms have already been employed there seems to be no reason why the other three should not be accepted.

The figure seems to demonstrate the normal presence in this fossil reptile of six distinct digits or dactyls. "This is a character not before observed in any air-breathing vertebrate. Some of the Amphibians retain remnants of a sixth digit, and *Ichthyosaurus* often has, outside of the phalanges, one or more rows of marginal ossicles that probably represent lost digits. With these exceptions, the normal number of five is not exceeded."

This condition of things in *Sauranodon* is worthy of consideration in view of the not infrequent occurrence of *sexdigitism* with man and others of the higher vertebrates. Darwin had suggested that this anomaly might be due to reversion, but (The Descent of Man, 1, 120, note) afterward reluctantly abandoned the hypothesis in consequence of Gegenbaur's denial of the existence of more than the regular number of digits in the Ichthyopteriga. His original view is now strengthened by Professor Marsh's account of the limbs of *Sauranodon*, but does not yet serve to explain the occurrence of more than six digits with man, the cat, and perhaps other mammals.

The other striking peculiarity of the sauranodont limb is the presence of *three epipodial* elements. All of them articulate with the humerus or femur, and Prof. Marsh suggests that the intermediate one represents the *os intermedium* which, in most air-breathing vertebrates, is more closely associated with the mesopodial bones. He thinks its proper place is indicated in *Sauranodon*, but that, "in the process of differentiation this bone has been gradually crowded out of its original position."

In the paper cited Prof. Morse offers a different interpretation ; "That the bone which he (Marsh) indicates as the intermedium is really the fibula, and the bone which he represents as the fibula is an outer tarsal bone which, with its metatarsal and phalangeal bone in series becomes obliterated in time ; that, in the process of differentiation, the intermedium is as likely to be partially compassed by the distal extremities of the tibia and fibula, as that a third bone of this (epipodial) segment had been crowded down into the tarsal series." Pending the discovery of new facts in paleontology, embryology, or comparative anatomy, it is probable that most anatomists will be predisposed toward the view of Professor Morse.

Those who are interested in the general morphology of the vertebrate limb should not fail to read the suggestive facts and considerations presented by Prof. Huxley in his paper on Ceratodus, Proc. Zool. Soc. of London, Jan. 4, 1876.

Most of Professor Morse's paper consists in the presentation of facts in corroboration of the opinion advanced by him in 1872, that the intermedium is represented in most birds by the so-called "ascending process of the astragalus" which, in an embryo heron, had been found by the late Professor Jeffries Wyman to have a separate centre of ossification. Figures are given of the parts as they exist in several aquatic species, and there seems to be no reason for doubting the correctness of Professor Morse's conclusions. Our author also reproduces Cuvier's figure of the tarsal region of the "Honfleur Reptile," afterward named by Cope *Lælaps Gallicus*, and Cope's figures of the same parts of *Lælaps* and *Ornithotarsus*. He considers that the intermedium is distinctly represented as an ascending process with *Lælaps*, but is in doubt as to *Ornithotarsus*, whether it is "represented by the enlargement of the tibiale in front, or was a separate bone which occupied the fossa on the anterior face of the tibia." The manus of the sea-pigeon (*Uria grylle*) is figured to show the interesting presence of "rudimentary nails on the second and third fingers, (index and medius)."

Dr. Chapman has profited by the unusual opportunities afforded to a zealous anatomist by the extensive zoological garden of Philadelphia, and by the large menageries which sometimes have their winter-quarters in the same city, and the papers here cited contain important contributions to our knowledge concerning two forms whose structures and functions are far from thoroughly known.

A young Indian Elephant was born on the 9th of March, 1880, the gestation having lasted either twenty months and twenty days, or twenty-one months and fifteen days, according as it is dated from the last or the first of the seven observed opportunities for its commencement. "Immediately after birth the mother rolled the young one in the straw. The young elephant, a female, stood 30 inches (about 75 cm.) in height, measured from base of trunk to root of tail 35 inches (about 88 cm.), and weighed 213½ pounds (about 97 kilograms). It was perfectly formed and well-developed ; it was noticed immediately that it sucked with the mouth, and not with the trunk, as Buffon reasoned it must do—an error so often repeated in works on Natural History.

Dr. Chapman was fortunate enough to obtain the fresh membranes, and to have them well injected. The figures and descriptions indicate that, as Turner had concluded from less perfect materials, the placenta of the elephant is *deciduous* as in the Primates and Carnivora, and *zonular* as in the latter group.

The generative apparatus of the female elephant presents some peculiar features, and although our author begins his concluding paragraph by saying, "it appears to me that there can be little doubt now that the generative organs in both species of elephant are understood," yet his admission, in a foot note, that what he had called vagina may be really an elongated *cervix uteri*, will lead other anatomists to avail themselves of any opportunity that may present in itself for further study of this portion of the proboscidean structure.

The anatomical account of the Orang is full of interesting facts and ideas, but most of them have been outlined already in No. 25 of this Journal. Like nearly all of the Orangs, whose brains have been examined, this example was young, estimated to be about three years old. The immaturity of the brain, together with the probability of considerable individual variation in the details of the cerebral fissures, should be taken into account in estimating the resemblances and differences with respect to man and the other anthropoids. Possibly these considerations may apply also to the somewhat mooted question as to the extent to which the occipital lobes of the cerebrum project over the cerebellum. Here, however, there enters

another element than the distortion or displacement to which Dr. Chapman very properly refers, namely, the *position in which the brain is held or placed.* In Dr. Chapman's figures, the organ rests upon the medulla, and upon the ventral aspects of the frontal and temporal lobes; were it brought into something approximate to its natural position, or to the position of the human brain, the occipital lobes would surely project beyond the cerebellum to an appreciable extent. It would be well if the next Orang's head should be sawn into sections parallel with the mesial plane, and the brain figured *in situ.*

It is gratifying to find Dr. Chapman, like Humphrey and Barnard, insisting that the "scansorius" muscle of Traill is really the entoglutæus. But Dr. Chapman does not seem to have observed the curious little muscle passing over the capsule of the acetabulum which Prof. Barnard has called "ilio-femoralis subrectus," and which, in the opossum, Coues seems to have mistaken for the unlucky "scansorius."

A novel and significant suggestion is that, "morphologically speaking, the laryngeal pouch of the anthropoids would be homologous with and replace the two layers of the cervical fascia in man."

This otherwise very commendable paper is marred by some important misspellings, as of *ilium* which is made *ileum* twice on page 4, and by an occasional obscurity of style which sometimes renders the author's meaning doubtful.

B. G. W.

ON THE CONSTITUTION OF THE NAPHTHALINES AND THEIR DERIVATIVES.

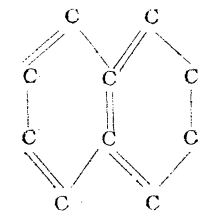
(Translated from the German.)

BY M. BENJAMIN, PH. B., AND T. TONNELÉ, PH. B.*

Among the many aromatic hydrocarbons, naphthaline is one of the most interesting. The causes and laws of isomerism may be studied from the numerous isomeric compounds on one hand, while on the other, much information is derived from the consideration that many of these have acquired a great importance in the technical arts. In consequence of this, a great number of memoirs exist on this subject, and they are scattered abroad among the numerous scientific journals. It is, therefore, no simple matter for one to obtain a clear survey of the naphthaline question. We hope that the following pages, comprising material originally collected for our own information, will be welcomed by such of our professional colleagues as may have occasion to study this subject, for we feel assured that by consulting this article much of their time and labor will be economized.

CONSTITUTION OF NAPHTHALINE.

Naphthaline was discovered in 1826, by Garden, and subsequently widely studied by many investigators; yet its constitution remained undetermined for more than forty years. In the year 1866, Kékulé[1] published his ingenious and fertile theory of the aromatic compounds, considering them as derivatives from a single hydrocarbon, benzol. Soon after Erlenmeyer[2] so extended this theory as to include naphthaline, which he considered as having been derived from two benzol rings possessing two carbon atoms in common.



Graebe[3] was the first to demonstrate the correctness of this theory, in the course of his remarkable researches on the chinones of benzol and naphthaline. Since then this theory has been sustained by a large number of facts, while no satisfactory objections have been brought forward against it.

Other formulæ have been proposed by Berthelot[4], and later by Ballo[5], and also by Wreden[6], but none of these have received the approval of chemists.

The following are the principal facts which support the formula given by Erlenmeyer and Graebe:

I. The bichlornaphtochinon $(C_6H_4)(C_4Cl_2O_2)$ yields on oxidation phthalic acid $C_6H_4\begin{cases}COOH\\COOH\end{cases}$ and it is also transformed by the action of pentachloride of phosphorus into the pentachloride of naphthaline $(C_6H_3Cl)(C_4Cl_4)$ and this on oxidation produces tetrachlorphthalic acid $C_6Cl_4\begin{cases}COOH.\\COOH\end{cases}$

These facts prove that naphthaline is composed of two symmetrical rings, and that it can only have the formula of Erlenmeyer by the acceptance of Kékulé's benzol scheme.

On the other hand, the ortho- (1, 2) position of phthalic acid is likewise shown which was corroborated by the examination of the benzol bi-derivatives (Graebe).[7]

Ladenburg[8] and Wreden[9] have objected to Graebe's method of proof, on account of the derivation of tetrachlorphthalic acid from phthalic being uncertain. It can just as well be obtained from tere or isophthalthic acid. This is improbable, because the tetra-chlorphthalic acid used, agrees in all its properties (formation of anhydrides, etc.), with phthalic acid, and not with its two isomers.*

II. Naphthalinetetrachloride $(C_6H_4)(C_4H_4Cl_4)$, by oxidation gives phthalic acid $C_6H_4\begin{cases}COOH\\COOH\end{cases}$ (Laurent). On submitting it to dry distillation it becomes converted into the α and β dichloronaphthaline $(C_6H_4)(C_4H_2Cl_2)$ and the latter (β) produces, on oxidation, dichlorophtalic acid $C_6H_2Cl_2\begin{cases}COOH\\COOH\end{cases}$ (Atterberg).[10]

III. Monochloronaphthalinetetrachloride $C_6H_4(C_4H_3Cl\,Cl)_4$ may be converted into ordinary phthalic acid by oxidation. (P. and E. Depouilly[11] and Widman[12].) Monochloronaphthaline, $C_6H_4(C_4H_3Cl)$ which is the basis of the above compounds may be converted into

* NOTE.—The following memoir, written by MM. F. Reverdin and E. Nötting, was published in Geneva early this year. In addition to the text herewith given, the original pamphlet was supplemented with several valuable tables. These showed the derivation and behavior with reagents of the various substitution products. It is with regret that we are obliged to omit them. The space which they would occupy, together with the fact that they are not of general interest, does not seem to warrant their insertion. The entire article is undoubtedly the best resumé of the different theories concerning the formation of the naphthalines in existence. (*Translators.*)

[1] Annalen der Chemie und Pharmacie, vol. CXXXVII, p. 129 (1866).

[2] Ann. Chem. Pharm., CXXXVII, 346 (1866).

[3] Ann. Chem. Pharm., CXLIX, 1 (1869).

[4] Ann. Chem. Pharm., CXLII, 251 (1867). Comptes Rendus, LXIII, 788 and 834.

[5] Das Naphtalin und seine Derivate. Braunschweig (1870).

[6] Deutsche Chem. Ges., IX, 590 (1876.)

[7] Ann. Chem. Pharm., CXLIX, 1 (1869.)

[8] Theorie der aromatischen Verbindungen Braunschweig. 1876, p. 36.

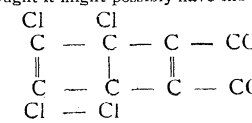
[9] Deutche Chem. Ges., IX, 547 (1877).

[10] Deutsche Chem. Ges. IX, 547, (1877).

[11] Soc. Chim., Paris, IV, 10, (1865).

[12] Om Naftalins Klorföreningar, Upsala, 1877, p. 16. Soc. Chim. Paris, XXVIII, 505, (1877).

*Wreden thought it might possibly have the constitution,



that is to say, be derived from an isometric hypothetic benzol. This is however, extremely improbable.