

headings in thicker type and by themselves at the top of each paragraph. For example the German edition says on page 185: "(a) Absorptionsverhalten einiger basischer Farbstoffe" running in one sentence the English version prints as follows:

"(a) *Basic Dyes*.

The order in which a number of basic dyes"

The original text itself is not written in the characteristic heavy style of the Germans but the English translation makes the contents even more easily assimilable. The English rendering is so well done that the

work no where reads like a translation and the meaning is everywhere more clearly expressed than in the original. Even if one were able to read German without the help of a dictionary we would recommend the English translation.

Finally we wish to endorse what the publishers communicate on the wrapper "This is the first account of Chromatography to be published in English and the first book dealing exclusively with a subject that has already proved of enormous value in different fields of research."

S. M.

PHYSIOLOGY OF RESPIRATION OF THE AIR-BREATHING FISH, *MONOPTERUS JAVANENSIS* LACÉPÈDE [= *FLUTA ALBA* (ZUIEW)] :—A REVIEW

MARKED seasonal changes, especially in regard to the alternation of dry and wet periods, in the climatic conditions of India have resulted in a number of interesting adaptations in certain fishes of the country. The most remarkable among such adaptations is the habit acquired by some forms to make direct use of the atmospheric air for tiding over periods of drought when the waters in which they live either become very stagnant or dry up altogether. Though this habit has been acquired by many species in a greater or lesser degree, depending on the environments in which they live, the end in view is the same in all cases; the means adopted for its achievement and consequently the structural modifications undergone by the various fishes belonging to widely separated families are, however, quite different. The highly interesting subject of aerial respiration in fishes attracted the attention of not only the earliest ichthyologists who investigated the Indian fauna but is still being studied by a number of students both in this country and abroad. With the advances in the technique for carrying out physiological experiments, the mass of data collected within recent years has materially helped to elucidate the nature and cause of evolution of this remarkable phenomenon. In a recent contribution on the subject, Wu and Liu (The Bucco-Pharyngeal Epithelium as the Principal Respiratory

Organ in *Monopterus javanensis*, *Sinensia*, April 1940, Vol. XI, pp. 231-38), as a result of direct observations and a series of illuminating experiments, have been able to establish that in *Monopterus javanensis* the bucco-pharyngeal epithelium serves as the principal respiratory organ, both in air and water; they have also been successful in elucidating the exact rôle of the gills and the skin in this vital process. Finally the authors studied the morphological features of the branchial apparatus of the fish with a view to ascertaining the rather limited function of the gills and the capacity of the fish for cutaneous respiration.

Wu and Liu describe in detail the mode of respiration of *Monopterus* and show that for six-tenths of the period the fish remains in a state of suspension, three-tenths in the aerial phase of respiration, and only one-tenth in the aquatic respiring phase. They fully support the reviewer's views (Physiology, Bionomics and Evolution of the Air-breathing Fishes of India, *Trans. Nat. Inst. Sci. India*, 1935, Vol. I, pp. 1-16) with regard to the less laborious nature of the aerial as compared with the aquatic respiration, higher efficiency of the aerial respiration in obtaining oxygen and, in consequence, only a small expenditure of energy on the part of the animal adopting this mode of obtaining air. From the results of their elaborate experiments on the efficiency of

the aquatic respiration in *Monopterus*, the authors conclude that "provided the supply of dissolved oxygen is sufficient, *Monopterus* can live under water indefinitely". In this respect also, the reviewer's (Physiology of Respiration and Evolution of Air-breathing Fishes, *Proc. Nat. Inst. Sci. India*, 1939, Vol. V, pp. 281-87) experimental data are fully supported by the Chinese workers. It is, however, remarkable to note that Das [Nature and Causes of Evolution and Adaptation of the Air-breathing Fishes (A resume), *Proc. 27th Ind. Sci. Cong.*, 1940, pp. 215-60] still holds that under no circumstances branchial respiration alone is quite sufficient for the maintenance of life in the case of the air-breathing fishes of India. A series of experiments undertaken by Wu and Liu to determine the chief organ of aquatic respiration of the fish—since the gills are greatly reduced—showed that whereas respiration by the gills and the skin could not maintain its life, that by the bucco-pharyngeal epithelium can. Thus it has now been experimentally demonstrated, what was pointed out by the reviewer in 1935, and reiterated in 1939, that aquatic and aerial respiratory surfaces are capable of interchanging their functions. The structures of the branchial apparatus

and the skin of *Monopterus* are described and the general conclusion is reached that:

"The gill of *Monopterus* is rudimentary inasmuch as the respiratory area has been greatly reduced. It has been proved to be physiologically dispensable, and the fish is likely to be 'drowned' if it depends solely on its gills for respiration. The skin possesses little histological specialization to facilitate the exchange of gases, and its capacity for cutaneous respiration is necessarily of meagre extent. The bulk of the work of respiration falls upon the bucco-pharyngeal epithelium, which now becomes the principal respiratory organ in function. Though habitually employed as the organ of air-breathing, the bucco-pharyngeal epithelium proves effective for aquatic respiration also, and by means of which *Monopterus* is able to live almost indefinitely under water or in air without the aid of gills, provided suitable physiological conditions are established. Structurally the bucco-pharyngeal epithelium is very simple and generalized on the whole, but it seems to be a perfect adaptation in itself, and its utility is even greater than the pharyngeal 'lung' of an allied fish, *Amphipnous cuchia*"

S. L. HORA.

CENTENARIES

Common, Andrew Ainsle (1841-1903)

ANDREW AINSLE COMMON, a British astronomer, was born at Newcastle-on-Tyne August 7, 1841. Owing to his father's premature death, he joined his uncle in a firm of sanitary engineers in London. But even as a boy of ten he had shown an interest in astronomy and when he settled in London, he revived this interest and set up a telescope in his house in 1874 and joined the Royal Astronomical Society.

By 1878 he had made sufficient observations with a silver-on-glass mirror of eighteen inches diameter to contribute a paper on the *Satellites of Mars and Saturn*. After five years of hard work, he completed in 1886 a five-foot equatorial reflecting telescope which was later taken over by the Harvard College Observatory. He made several mirrors and presented some to the Royal Society to make observations on the eclipses and some bigger ones to various other observatories.

Common was a pioneer in the application of photography to heavenly bodies. For he was practically the first to develop and describe its possibilities in a paper published in the *Monthly*

Notices in 1879. In 1881 he photographed the great comet of that year. This is the first recorded photograph of a comet. In 1882 he took a magnificent photograph of the great nebula of Orion. Thus he opened the way for further strides in astrophysics.

As a mark of appreciation of his successful attempt at astronomical photography, the Royal Astronomical Society awarded its gold medal to Common in 1884. He was elected F.R.S. in 1885 and became its president during 1895-97. He became an LL.D. of St. Andrews in 1891 and became the first president of the Astronomical section of the British Association which was formed in 1900. His address gives an elaborate history of the construction of astronomical instruments in the nineteenth century including his own work on reflecting telescopes. His address contains the prophetic statement "Photography also comes in as a further aid to the telescope, as it may possibly be to the microscope".

Common died suddenly of heart failure at his house at Ealing June 2, 1903.

S. R. RANGANATHAN,

University Library,
Madras.