

untired frog's muscle is sufficient to raise 3 mgrm. of water from 0° to 1° C.

7. By adopting some very probable assumptions it can be inferred that the combustion of assimilated food, as far as the oxygen inspired is employed in producing chemical force, takes place almost exclusively in the muscular tissues.  
P. FRANKLAND

#### ERNST HEINRICH WEBER

WE are called upon to chronicle the death, at Leipzig, on January 26, of Prof. Ernst Heinrich Weber, whose name is so closely united with the fundamental principles of modern optics and acoustics. He was born at Wittenberg, June 24, 1795, and after having studied at the university of that city received, in 1815, the degree of M.D. Two years later he published a short work on the anatomy of the sympathetic nerves, which brought his name at once into prominence. The following year he was appointed extraordinary professor of anatomy at the University of Leipzig, and in 1821 he became ordinary professor of human anatomy. He was early well known by his edition of Hildebrandt's "Anatomie," of which he wrote anew a considerable part in 1830. The chair of physiology was offered to him in 1840, and he actively fulfilled the duties of this position until a short time before his death. During this period he issued several manuals of physiology, and published a number of investigations, the most valuable of which are gathered together in his book "Annotationes anatomicæ et physiologicæ" (1851). Science is, however, chiefly indebted to Prof. Weber for the classical researches carried out by him and his brother Wilhelm Eduard while still young men, on which is grounded the celebrated wave-theory. The work in which their investigations are recorded—"Die Wellenlehre auf Experimente gegründet" (1825), is a remarkable relation of the most delicate and ingenious observations ever undertaken to establish a series of physical laws. Among the most notable of these might be mentioned the experiments on waves of water in mirrored troughs, by means of which they found that the particles near the surface move in circular paths, while those deeper in the liquid describe ellipses, the horizontal axes of which are longer than the vertical. By another series of comparative observations on water and mercury the law was established that waves moved with equal rapidity on the surfaces of different mediums, while the rapidity increases in both cases with the depth of the liquid. These and a multitude of other facts, studied and elaborated in the most scrupulous and conscientious manner, form the basis for the whole theoretical structure accepted at present as explanatory of the phenomena of light and sound. So thoroughly and scientifically were these researches carried out that subsequent physicists have never been called upon to correct them. In 1850 Prof. Weber completed an extensive series of experiments designed to study the wave-movement in the arterial system and explain the fact that the pulse-beat was felt at the chin a fraction of a second sooner than in the foot. The results showed that the pulse-beat travels with a rapidity of about thirty-five feet per second, and that in general the rapidity of a wave in small elastic tubes is not affected by the increase of pressure on the walls. At a later date Prof. Weber published some interesting results of experiments on the mechanism of the ear, as well as on the microscopic phenomena visible on bringing together alcohol and resin suspended in water in capillary spaces.

#### DR. P. BLEEKER

ON January 24 death quite suddenly overtook one of the most indefatigable workers in the field of zoological science, the well-known ichthyologist, Dr. P. Bleeker, who died at his residence in the Hague, at the age of fifty-nine. Born at Zaandam in 1819, he had an early taste for natural history, and studied medicine with a

view to an appointment in the army. In 1838 he received an appointment in the medical staff of the East Indian army, and left for Batavia. Here an immense field was soon opened to his activity. He set himself to form an immense collection of fishes from different parts of the colonies, assisted in many ways by a number of his medical colleagues at different stations. He himself always remained at Batavia, gradually rising in his profession till he obtained the inspectorate of the Colonial Medical Service. At the same time he was the centre of a keen scientific movement in the capital of the Dutch Indies, starting several societies and taking the chair in the principal of them for many consecutive years. His contributions to the Indian ichthyological fauna were regularly published in Batavian scientific journals. In 1860 he returned to his native country, and first took up his residence at Leyden, with a view to comparing the treasures contained in the zoological collections there with his own. Extensive consignments of fishes had been made by him to this institution at the time of his residence in Batavia, part of the arrangement and determination of which he now took upon himself. Not long afterwards he went to live at the Hague, where the dignity of Councillor of State Extraordinary was conferred upon him. He set to work at the gigantic task he had undertaken—the publication of his "Atlas Ichthyologique des Indes Orientales Néerlandaises," seven volumes of which, illustrated by several hundreds of coloured plates have appeared. He was herein largely assisted by grants from the Colonial Government. Many important groups, the Gobioidæ, the Scombridæ, the Scorpenidæ, &c., as well as the whole of the Elasmobranchs are left unfinished. He himself estimated that little less than half of the work remained to be published, and latterly had misgivings whether he would really be able to finish it.

The number of separate publications on East Indian fishes which have appeared from his hand in different journals exceed three hundred; they form the basis on which he gradually raised the structure of his Atlas.

He had brought home his large collection of spirit specimens which has always remained in his private possession. Of late years, as he advanced with the publication of his Atlas, he disposed of the specimens of those groups which he had finished; in this way no less than 150 of his unique type-specimens were acquired by purchase by the British Museum. Another disadvantage under which a private collection of these dimensions often labours—and Bleeker's was no exception—is the loss of the exact localities from which the different specimens of one species were procured, a detail which is afterwards of such high importance in determining the geographical range of varieties. Here, however all the specimens are mixed together in one bottle without being separately labelled.

An extensive collection of reptiles and amphibians from the Archipelago, on which he had published several papers during his stay in India, have passed to the British and Hamburg Museums.

#### ABOUT FISHES' TAILS

MOST people know the difference in shape that there is between the tail (caudal fin) of a salmon and that of a shark; how in the former the lobes of the fin seem to be equal or symmetrical (homocercal), and in the latter only the lower lobe of the fin is, as it were, developed, and the back bone (vertebræ) of the fish seems to be prolonged into the feebly-developed upper lobe (heterocercal). This remarkable distinction was first of all recognised by Agassiz, and long ago Owen wrote, "the preponderance of heterocercal fishes in the seas of the geological epochs of our planet is very remarkable; the prolongation of the superior lobe characterises every fossil fish of the strata anterior to and including the magnesian limestone; the