

Verworn, Max Richard Konstantin

4.11.1863, Berlin - 23.11.1921, Bonn

German physiologist Max Verworn was a main proponent of General physiology, a research field that emerged between cell research, evolutionism, and experimental physiology in the second half of the 19th century.

Verworn came from the family of a Prussian civil servant. He went to the humanistic Friedrich Wilhelm-Gymnasium in Berlin. In 1884, he took up his studies of medicine, botany and zoology, among others, with Emil Du Bois-Reymond, Rudolph Virchow, and Franz Eilhard Schultze.

Directed by Schultze, Verworn was awarded a Ph.D. for his work on fresh-water bryozoans, a group of colonial invertebrates that possess exoskeletons. Shortly after, Verworn moved to the University of Jena, to pursue his scientific studies with Ernst Haeckel, William Preyer and Wilhelm Biedermann. In 1889, he was awarded the degree of a medical doctor for his experimental work on the physiology of protozoa, i.e. unicellular organisms (infusoria, amoebae, ciliates, etc.). One year later, he passed the medical state examens. In 1891, Verworn received his habilitation in physiology. In 1895, he became extraordinary professor at Jena University. Six years later, he accepted a call to the Göttingen Physiology Institute, in 1910 he moved to Bonn University as a successor to Eduard Pflüger. In Göttingen and Bonn, Verworn attracted a large number of young scholars from within and without of Germany, among others, F. W. Fröhlich, Y. Ishikawa, H. Nagai, A. Pütter, J. Vészi, and H. Winterstein.

Verworn was one of main proponents of General physiology, a research field that, against the background of evolutionism, emerged between experimental physiology and cell research in the 1850s. Verworn's experimental investigations were mainly devoted to elementary processes in muscle tissue, nerve fibers, and sense organs. In contrast to physiologists such as Claude Bernard or Emil Du Bois-Reymond, who favored research in whole animal organisms and members or organs, the starting point of Verworn's physiology was the "elementary organism", i.e. the cells and unicellular organisms functioning as models for the cell. Inspired by Haeckel's evolutionism, Verworn assumed that "on the lowest level of life generally" all physiological phenomena one observes in the highest organisms could already be found in their simplest form. His numerous studies in protozoa, conducted partly in Jena, partly at the Zoological Station of Anton Dohrn in Naples, and partly in Egypt and elsewhere, concerned phenomena of regeneration, the relation between cell nucleus and psyche, and the relation between stimuli and reaction in the application of galvanic current.

In 1895, Verworn published his text book General Physiology [Allgemeine Physiologie], elements of the doctrine of life. Taking the cell as a starting point of all physiological research, Verworn supplemented Virchow's cellular pathology by means of a cellular physiology. The readership of this textbook extended beyond the scientific audience, also because Verworn offered clear statements on the contemporary debates about the relationship between physiology and psychology, the question of vitalism/mechanism, and the problem of monism. Building upon the research work done in his Bonn laboratory, Verworn showed later that the so-called all or none principle also applied in spinal nerves. The validity of this principle was demonstrated before by H. Bowditch with respect to the frog heart and K. Lucas with for single muscle fibers. In 1914, Verworn explained, his findings were not to be reconciled with the earlier assumption that "within the nerve fibre depending on the intensity of the stimulation, excitations of various intensities occur and are conducted." Instead, one had to assume that the weakest and the strongest stimulation provoke excitations of identical intensity. Similar findings were almost simultaneously presented by English neurophysiologist D. E. Adrian.

In 1902, Verworn founded the Journal for General Physiology [Zeitschrift für Allgemeine Physiologie]. Until his death, he was editor of that journal. In the period after the turn of the century, Verworn got interested more and more not only in the cellular-physiological foundations of human thought (association, memory, etc.), but also in the ontogenesis and phylogenesis of human creativity. Thus, he was involved in the excavation of skeleton parts and tools of the stone-age humans in Oberkassel (near Bonn). Shortly later, he conducted drawing experiments in school children showing that between children drawings and paleolithic drawings hardly any similarities exist. As in his physiological work, Verworn's anthropological and cultural historical studies implied that the initial in development was at the same time the systematic elementary and general. In this sense. His chemico-physically based "psycho-monism" aimed at a comprehensive theory of all phenomena of life.