

DR. GEORG KARSTEN, docent in botany in Kiel, Dr. Richard Abegg, docent in physical chemistry at Göttingen, and Dr. Böhming, docent in zoology at Gratz, have been promoted to associate professorships. Dr. Reitzenstein has qualified as docent in chemistry at Würzburg and Dr. Simon as docent in physics in Göttingen.

#### DISCUSSION AND CORRESPONDENCE.

##### SUBSTITUTIONAL NERVOUS CONNECTION.

In a series of recent papers the writer has endeavored to show that the idea now apparently dominant that, with the single exception of the olfactory, the peripheral nervous connections are indirect rather than direct is an unwarrantable assumption. It has been found possible to demonstrate in the skin termini of nerves which are, so far as can be seen, unimpeachable instances of connection by continuity. These are then of the same nature as the connections of the olfactory cells with the fibres of the olfactory nerve. On the other hand, it appears that some of the most careful observers have detected similar rod-cells with special nervous functions which are only in indirect communication with the nerve which conveys the stimulus. If it could be shown that the sensory cells are uniformly without nervous processes it might be assumed that they constitute by themselves a special class of nervous organs which normally do not acquire the neurite, but the admitted existence of such a process of the olfactory cells and the fact that these cells are otherwise so similar to the other instances of nervous endings, in which it seems to be proved that this sort of direct connection is absent, prevents the possibility of establishing such an independent class of structures. Still more, if our own observations are taken into account, it seems necessary to offer some other suggestion to account for the discrepancy in this particular. Take, for illustration, the case of the organs of taste, which, in spite of their evident resemblance to the olfactory termini, are generally stated to have only indirect nervous connections. I have elsewhere suggested the possibility that in the case of these sense organs the original proton is to be found in the same paired bands of cells from which the olfactory

epithelium is derived. It is admitted that to these other elements have possibly been added by way of the gill clefts, but it seems only natural to suppose that the palatal portion, at any rate, may have had the origin suggested. If this were so, it is evident that there is no relation between the position of the peripheral proton and the source of the nerves supplying these organs. It might be suggested, therefore, that the original nervous communication having been lost, the new connection has been established in a secondary manner by the apposition of what at one time were free termini between the cells to these specialized cells. If the illustration chosen appears far-fetched, a more general illustration will indicate still more clearly the application of theory proposed. There can be no doubt that, on any theory of evolution of the higher vertebrates from the lower, a difficulty arises in the attempt to construe the fact that the lateral line organs with their homologues and allies do not seem to obey a constant law of nervous supply, while in the higher vertebrates it is difficult to follow the transformations which these organs have undergone. It is possible that these difficulties will largely disappear if the probability be admitted that, in the course of evolution, the original connections have been lost or diverted and that new ones have then been established by the application of some of the free nerve endings to the cells thus deprived of their original nervous connections. That some such changes have taken place seems to the writer more than probable. If this be admitted, it is not to be wondered at that in the lower vertebrates especially the two sorts of endings may be encountered side by side in different parts of the skin. It is not the present intention to enlarge on or illustrate this thought, which is thrown out in the hope that the suggestion may prove fruitful in the hands of others.

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##### THE EXHIBITION OF CETACEANS BY PAPIER MACHÉ CASTS.

TO THE EDITOR OF SCIENCE: Mr. F. A. Lucas calls my attention to the following passage in an editorial notice of the new Cetacea Gal-