

plate beneath the cell, from which the nerve fibre starts with a broad base (Fig. 6). I consider this a chief point of difference between this peculiar cell and all the other afore-mentioned cells of a motor character. Fig. 6 gives a good idea of this magnificent histological specimen with its elegant nucleus showing its network and its nucleolus on one side.

Reviewing from a physiological standpoint the several facts stated above, we must feel convinced that the peculiar ganglion cells which are invariably found in relation to electric organs must play an essential part in bringing the electric organ into action. In my opinion that is tantamount to proof that other ganglion cells must be essential for sending nerve impulses to peripheral organs, and that the idea lately suggested by Nansen that ganglion cells have only a trophic influence on nerve tissue cannot be reasonably maintained in the face of these and similar facts. I may here refer to the well-known peculiar ganglion cells found in the motor region of the brain of higher animals, including man. Betz, who discovered them, searched for them for the purpose of stating anatomically the laws of localization found by Prof. Hitzig and myself.

It may not be out of place to adduce here another piece of evidence taken from the department of pathology. My friend and collaborator Hitzig has lately published the case of a man who died from tetanic cramp of the head. He observed that in the ganglion cells of the motor centre of the fifth nerve presiding the affected muscles there was a very singular change to be observed *in these cells only*. It appears that the bacteria of tetanus caused a granular decomposition of the protoplasm in the cells, which led to a further state of degeneration characterized by the appearance of large holes, while the other ganglion cells and the remainder of the organ appeared quite healthy. I am convinced the case shows that the cramps in the combined muscles resulted from the irritation and gradual disorganization of the ganglion cells.

The above statements may suffice to show that the electric fishes and their nervous elements are really not such outsiders in science, and that the observations made on them should be brought into comparison and correspondence with those gathered from other sources. Indeed the histological elements in their organs are so instructive, that I would strongly recommend that the conclusions deducible from their study should be employed in maintaining well-founded former notions regarding the organization of the nervous system in vertebrates against certain revolutionary ideas of some modern authors. GUSTAV FRITSCH.

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AUSTRALIAN TRAVELS.¹

ON opening this work, one is at once struck by the beauty of the illustrations, particularly those of the New Zealand Alps. The double-page plate opposite p. 248, drawn from a photograph taken by the author, is especially worthy of remark. For effect this view may well compare with some of the most picturesque parts of Switzerland. Some of the photographs, however, have a familiar appearance to the travelled reader; one recognizes in the beautiful picture "Off the West Coast of Ceylon" (p. 300) an old friend, none the less worthy of reproduction.

¹ "Australische Reise," by R. von Lendenfeld, pp. 325, with Illustrations. (Innsbruck: Wagner, 1892.)

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The work makes no pretensions to a virgin freshness its professed object being to gather together the already published observations of the author, and to present them in a popular form. This it does very successfully, though the English reader could have dispensed with a good deal of the very apparent "padding." Thus the first twenty pages of this book of travel are devoted to the history of Australia, and remind one of Coghlan's opening chapter in the "Wealth and Progress of New South Wales": the next twelve pages on gold differ from Coghlan's second chapter, particularly in giving greater prominence to Count Strzelezki's discovery, and one regrets that no mention is made of James McBrien, who certainly ha

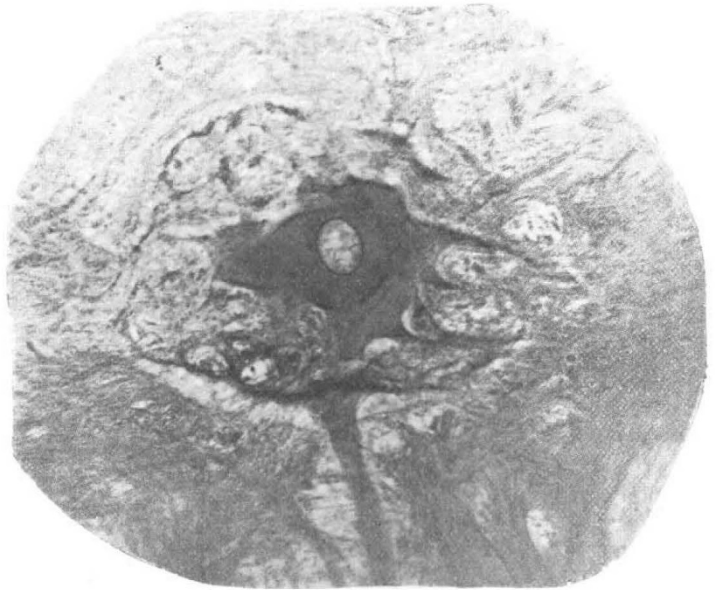


FIG. 6.—The right giant ganglion cell with the origin of its electric nerve from spinal cord of Malapterurus.

prior claims. The author is candid in his criticisms and condemns both the theatres and University of Sydney, as being, from the German standpoint, decidedly bad. On p. 34 we come to a "Journey into New South Wales," and here commences an interesting medley of natural history, traveller's tales, and geographical investigation. In this vacation ramble Von Lendenfeld claims to have discovered the culminating point of the Australian continent in Mount Townsend, to which he assigns (by aneroid) the height of 2241 metres. The doggerel verse on p. 82, in which a red sunset is taken to indicate approaching rain, must be wrong in its meteorology, so at least it proved, a red sunset being followed, much to Lendenfeld's surprise, by a fine day. It is satisfactory to find that the signs of the weather are not inverted at the Antipodes.

The author's familiarity with glaciers and ice-action in Europe served him in good stead in the southern hemisphere. Several interesting pages are devoted to his discovery of the former existence of glaciers in the Australian Alps; though there seem to have been contemporaries in this matter, for while Von Lendenfeld's observations proved the existence of *moutonnée* and striated surfaces down to a level of 1500 metres above the sea—Mr. James Stirling claimed to have found signs of ice-action at lower levels still, as in the neighbourhood of Omaso, where they occur at 800 metres above sea-level. The historical conscience is strong in the author, or he would scarcely have troubled to recall the

fact, that when his communication on the discovery of glacial markings was read before the Geological Society of London, it was received with scepticism by Prof. Bonney (and, let us add, though the author does not, by Dr. Blandford also). On turning to the *Journal* of the Society we find that Prof. Bonney considered the observations then adduced by Von Lendenfeld as insufficient to establish his conclusions, and in this opinion we fancy most geologists will be inclined to agree with him. That the conclusions were right after all is a different matter. It is to be regretted that even in this, his latest published summary, Von Lendenfeld does not always supply us with facts on which we can base an independent judgment. The personal opinion of an observer, however skilled, can be no sufficient substitute for these. A single instance will suffice. An important joint expedition was undertaken by the author and Mr. Stirling to examine into the accuracy of the latter's statements as to the downward extension of the ice. After several pages of interesting traveller's gossip we reach the result in words much to the following effect:—"After three-quarters of an hour's ride in the valley bottom we reached an old moraine, which we investigated closely. A dam 35 metres high and 200 broad composed of various (*verschieden*) great blocks of rocks with sharp angles stretched across the valley. A brook flowed through the middle. We are here at a height of from 900 to 1000 metres, and since it is a veritable moraine Stirling is right and our dispute is ended."

We will not offend the susceptibilities of the author by questioning whether this is really a moraine: probably it is; but no convincing proof of the fact appears in the description. One would like to know whether other signs of ice-action were observed in the immediate neighbourhood, in what respects the fragments differed from each other and from those of the adjacent valley slopes, and especially what evidence existed to show that they had been carried down the valley, and how far they are removed from their source. This information could have been conveyed in a few words, and would have been welcomed by inquiring minds, who now may wonder whether after all this dam could by any chance be merely the remains of an ancient landslip. New Zealand is introduced to us on p. 161, and after a short historical account we pass on to the New Zealand Alps and fjords. With regard to the latter the author stoutly maintains their glacial origin: one of his chief arguments resting on their great depth as compared with the sea into which they open. They are apparently submerged rock basins, but although the author may be right in his contention that they are not merely moraine-dammed valleys, yet he altogether overlooks another more probable explanation, depending on unequal subsidence: submergence of the land has certainly taken place, and one has only to concede that the central mountain masses have sunk to a greater extent than the adjacent sea-floor to understand how the previously existing valleys would be converted into fjords. The greatest depth of Milford Sound is 360 metres, and one must travel (so our author tells us) at least 100 kilometres from the coast before this depth is reached at sea; now as the watershed is distant only 30 kilometres from the coast, it is at least as probable, considering the gradient, that we have to do here with differential movements of the land, as with locally concentrated erosive action.

An ingenious attempt to explain the last glacial episode leads to several bold generalizations. The author commences with the assertion that the whole of the southern hemisphere is at present much more severely glaciated than the northern, indeed he goes so far as to state that the northern hemisphere in the middle of the ice period was not much more severely glaciated than the southern is now. Since the mean temperature of the southern is not lower than that of the northern hemi-

sphere the reason for its excessive glaciation must lie in a more uniform climate and a damper atmosphere; and these again are a direct consequence of the greater extent of the oceanic surface.

Let us now suppose the sea-level in the northern hemisphere to rise 100 metres, the lowlands will become submerged (as during the last glacial episode they apparently were) the climatal conditions will then approach those now prevailing in the southern hemisphere, and excessive glaciation will result.

But in the southern hemisphere also, the ice was formerly of much greater extent, and this is not susceptible of the same explanation, since a depression of the land would not greatly affect the existing climate. What, however, would be the effect of a depression of the sea-level? The submarine slopes of most of the land in the southern hemisphere are so steep that the present distribution of land and sea would not be largely modified, though the latter should sink 300 metres; on the other hand, the increase in the height of mountains (300 metres) would lead to a descent of the snow line, the growth of snow fields, and a corresponding enlargement of glaciers. Thus the glacial episode in the northern hemisphere might be attributed to an elevation of the sea-level, that in the southern to its depression: and these changes of level may have been produced by a bodily movement of the ocean waters from one hemisphere to the other, a result itself possibly due to a shifting of the centre of gravity of the earth. The author does not explain how to shift the centre of gravity of the earth.

We notice that the author speaks with disrespect of the maps of the Tasman glacier by Mr. W. S. Green, stating that they are nothing like so good as Von Haast's; since however, later explorers prefer them to Von Lendenfeld's own, it would appear that we have here a descending scale of excellence.

After pointing out the failure of Mr. Green to reach the actual summit of Mount Cook, the author gives a glowing account of a successful ascent of his own, not of Mount Cook however, but of the Hochstetter Dome! He therefore claims to be the first who has set foot on the top of a high mountain in New Zealand. We offer him our congratulations.

In commenting on the author's style, which in its lucidity is far more English than German, we must offer a serious protest against his manner of using what he terms our "transcendentally intense adjective." Bob Acres' remark that, "The best terms will grow obsolete. Damns have had their day," does not appear to apply to Australia, where, to judge from our author, they flourish along with other survivors of a Mesozoic age.

AMERICAN FORESTRY.¹

COMPETENT English authorities on forestry are so rare that no apology is needed for presenting some extracts from a translation from the German, of an important paper by Sir D. Brandis on American forestry. This is in continuation of a similar translation which appeared about a year ago in the columns of NATURE (vol. xlv. p. 60).

Upwards of 1,000,000 acres of forest are required for the annual supply of wooden sleepers for European railways. These forests are properly managed so as to yield a steady return, whilst nothing of the kind can be said of American forests. This explains why German foresters are interested in watching the progress of forest destruction in America, where it is now merely a question of ten or

¹ "The Silva of North America." By C. S. Sargent, vols. i.-iv. (Boston and New York, Houghton, Mifflin and Co., 1891-02). Notes on the above by Sir D. Brandis, K.C.T.E., F.R.S., in *Zeitschrift für Forst und Jagdwesen*, October, 1892.