the nerves that controlled the affected muscles. The patient seems to have been carefully and skilfully handled, both by physicians and surgeons. Medical and surgical skill have exhausted themselves in the effort to cure him. He is by no means well and sound. There are many similar cases and their disorders belong to that long list of neuroses that, alas, must be classed in our present knowledge as incurable. Will not the neurologists come to the rescue and tell us the nature and cause of the disease? Then let us hope a remedy may be found.

NEUROLOGISTS AND NEUROLOGICAL LABORATORIES.

IV. NEUROLOGICAL WORK AT ZÜRICH.

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J. J. Honegger works quite independently of the other neurologists of Zürich. He is the representative of the old school of anatomical research, restricting himself as much as possible to the descriptive anatomy of the adult brain. Although a pupil of Huguenin and Meynert, unlike them, he never left the ground of anatomy proper and therefore never exposed himself to the criticism of belonging to the speculative school. This is certainly meritorious. Wild speculation has been so demoralizing that anatomy is, in the hands of many, little more than a yielding and practical source of apparent proof of preconceived ideas and is no longer the exact description of what the eye sees.

Our great biologists have shown us what anatomy has to be in order to be a creditable science. They had the advantage of finding a great amount of apparently dead material in the anatomical descriptions of former times; they brought it back to

life by utilizing it for the problems of physiology and they continued its study so as to make it both profitable and trustworthy. The problems of physiology and of evolution take more of the interest of the present generation than the dry and often unsatisfactory humiliating study of descriptive anatomy. Yet, it is better that the anatomist should say: Here I am at the limit of my present knowledge—than that he should make the uncritical reader believe that his speculations belong to the category of proved facts. I admire Honegger for limiting his discussions to what belongs to his field, giving all that he could obtain, but with severe criticism, from a strictly anatomical standpoint. In this way he offers all the information which anatomy can give him; he leaves the solution of the physiological problems to the physiologist and is not misled, like Meynert, to be too ready to see in his preparations what his speculations made him presuppose.

Honegger began his anatomical research in 1876 under Huguenin's direction. In 1879 he worked in Meynert's laboratory and since that time he devoted much of his leisure adding to his splendid collection of serial sections. He was first working on the selachian brain, but was finally led to a question of more special interest which he treats so fully in the only publication he has so far produced, in the paper on the Fornix.¹ In order to understand Honegger, it is absolutely necessary to be familiar with Ganzer's excellent monograph on the brain of the mole, and with most of the literature on the parts in question. He, who studied all this, will not fail to admire the learning and earnest research of Honegger, although it will be difficult to excuse him for giving the reader so much trouble, the style and the absence of more instructive drawings making the reading exceedingly difficult.

After a very elaborate review of the literature on the fornix, he starts with a discussion of the histological and morpho-

¹ Vergleichend-anatomische Untersuchungen über den Fornix und die zu ihm in Beziehung gebrachten Gebilde im Gehirn des Menschen und der Säugethiere. Mit 10 Lichtdruck-Tafeln. von J. J. Honnegger. Recueil Zoologique Suisse, t. V. Geneva, 1890.

logical relations of the cornu ammonis. He shows clearly that the knowledge of this region is still limited and that we are not justified in making too many assertions before the method of Golgi has satisfactorily shown the histological connections of all the various elements. After the cornu ammonis, Honegger treats the following parts: stria Lancisii; psalterium, fornix longus and fimbria; septum pellucidum and pedunculus septi pellucidi; columnae fornicis; tuber cinereum and corpus mamillare; decussatio subthalamica posterior and pedunculus corporis mamillaris; Vicq d' Azyr's and Gudden's bundles; fasciculus longitudinalis posterior; tænia thalami optici; ganglion habenulae, pedunculi conarii; Meynert's bundle, tænia semicircularis, nucleus amygdalæ. As I hope to enter very fully on Honegger's work in a future paper, I give merely these outlines here.

The results of Honegger's very intricate studies are rather unsatisfactory, inasmuch as they are to a great extent negative, telling us that we have no right to use many dogmatic views of authorities before they have found fuller proof. A comparison with Alexander Hill's speculative method shows, however, the value of such "negative" and critical work and numerous remarks, especially those relating to the anatomy of lower vertebrates, make us feel hopeful that the strictly objective study will finally triumph over apparently ingenious but often badly founded speculations.

Honegger's collection is worth seeing because it contains the finest carmine and gold series, such as are becoming very rare since the carmine of today is so bad that haematoxylin governs the field entirely.

Prof. Paul Martin, whose paper on the embryology of the cranial nerves¹ is not accessible to us, cannot devote as much time to neurology as the above mentioned scholars. His collection, however, is very interesting on account of the fine Golgi preparations and the embryological material. There is no

¹ MARTIN, P. Die erste Entwicklung der Kopfnerven bei der Katze. öster. Mon. Schr. f. Thierheilkunde. 15. Jahrgang; Sept., 1890.

doubt that we are going to obtain many valuable contributions from this author.

Prof. I. Gaule¹ has written several interesting neurological papers. His work is, of course, largely dealing with physiology but has so many original features that I wish to mention one paper on the numerical relations of the medullated fibres of the spinal cord of the frog. Gaule compares the number of the fibres of the cross-section with the corresponding number of the entering peripheral nerve-fibres. He starts from the following suppositions:

1. Every fibre of the white substance is in functional coordination with the central ends of the root-fibres.

2. The fibres of the white substance form connections among the central ends of the root-fibres themselves and with the brain.

3. The white fibres may be divided into the following groups:

- a. tracts which go beyond the spinal cord into the oblongata and other parts of the brain,—the long tracts;

- b. connections within the spinal cord among its various segments—intermediate tracts;

- c. connections of all the single elements within the same area—short tracts.

4. The central end of every root-fibre corresponds to a certain number of fibres of the white substance, the number being constant for every one.

5. The central ends of the root-fibres and consequently the starting-points of the corresponding fibres are not far from the entrance of the roots into the spinal cord.

6. The length of the fibres of the white substance depends on their function, i. e., on the distance of the segments united.

7. The central end of every root-fibre contributes two fibres for the long tracts, the one for the same side, the other for

¹Gaule, J. Zahl und Vertheilung der markhaltigen Fasern im Froschrückenmark, Mit 9 Tafeln. Abhandlg. d. mathemat. phys. Klasse der kgl. sächs. Ges. Wiss. XV. 9. p. 739. 1889. and Edinger Jahresbericht f. d. Jahr 1890; p. 31-33.

the opposite, the intermediate tracts receive one fibre, the short tracts eight fibres (two ascending and two descending ones on each side).

According to Birge, the brachial enlargement of the spinal cord receives about 4000 root-fibres, the dorsal "region 1500, and the lumbar enlargement about 4500," making altogether 10000 root-fibres. Gaule counted the fibres of five sections, and compared the actual number with the number obtained on ground of his hypothesis. For the first section (from the upper end of the cervical cord) he makes the following calculation:

1. Fibres of the long tracts, 2 for each of the root-fibres entering the spinal cord. $10,000 \times 2$ 20,000
2. Fibres of the intermediate tracts: none; as they don't reach this segment. _____
3. Fibres of the short tracts. 4 to each fibre of the half of the brachial enlargement $\frac{4000}{2} \times 4$ 8,000

Fibres of one half of the section 28,000

Fibres of the whole section 56,000

The results of the hypothesis and of the actual number obtained in the 5 sections compare very favorably:

Section	I.	Hypothesis	56000	actual number	56674
"	II.	"	74000	" "	74699
"	III.	"	45500	" "	41825
"	IV.	"	60500	" "	61058
"	V.	"	18000	" "	16313

Conclusive as this proof of the hypothesis seems to be, there is no doubt that it has to be accepted with due reserve for reasons too numerous and too obvious to be mentioned here. I put this abstract before the reader, because this instance is a fair example of the speculative character of Gaule's work.

Dr. Wlassak, Gaule's assistant, has so far published an anatomy of the cerebellum of the frog and is now preparing a number of interesting studies on other parts of the amphibian brain.

In this short review I have not been able to do full justice to any one of the Zürich scholars; but if I have succeeded in inducing some of my readers to take up a careful study of the works mentioned, I feel confident that they will agree with me in calling Zürich a remarkably productive neurological center.