SATURDAY, JULY 31, 1880.

## THE CEREBRAL FISSURES OF THE DOMESTIC CAT, *Felis domestica.*

BY BURT G. WILDER, M. D.

The discovery of the electrical excitability of certain cerebral convolutions renders more than ever desirable some common nomenclature of the folds themselves and of the fissures by which they are defined. For various reasons, some of which were stated by me in 1873 (11,219), the *fissures* should first be identified, and their names agreed upon.

Two notable contributions to fissural homologies and terminology have been recently published by Julius Krueg. An abstract of the paper on Herbivora was given by Horsley in *Nature* for January 23, 1879. The second paper, upon the fissures of the Proboscidea, Hyracoidea, and Carnivora, was published in January of the present year, but did not reach the libraries in this country until May. The larger part of the paper is devoted to the Carnivora, and will prove more useful, practically, than the remainder. After a general historical sketch Krueg discusses the manner of formation of the fissures, taking the cat as less subject to variation than the dog. He then enumerates the fissures, with brief characterizations, under three heads: "Grenzfurchen, Hauptfurchen, Nebenfurchen." The detailed account of the fissures is divided into "Canidæ, Felidæ, Hyænidæ und Protelidæ, Viverridæ, Mustelidæ, Procyonidæ, Ursidæ, Phocidæ und Otaridæ." A separate historical sketch is given with each section, and four of the five folding plates of excellent outline figures are devoted to the carnivoral fissures.

In fulfillment of a purpose announced in 1873 (11,229), I have nearly ready for publication a somewhat extended paper upon the Gross Anatomy of the Brain of the Domestic Cat. The conclusions which I had reached respecting the nature, relations and nomenclature of the fissures accord in most respects with those of Krueg. In the hope that his paper may incite others to take up this branch of comparative anatomy, I desire, upon the present occasion, to point out the improvements which Krueg has made upon his predecessors, and at the same time to suggest some amendments to his views.

Krueg does not state whether the brain figured by him is intended as a type, or is merely selected from among the 12 adult brains which he examined. The following figures represent what seems to me to be a comprehensive type of the fissural pattern of the domestic cat, based upon at least 200 specimens, mostly prepared by myself.[1]

### EXPLANATION OF THE FIGURES.

The figures are enlarged about two diameters. Fig. 1, the lateral aspect of the hemisphere and lobus

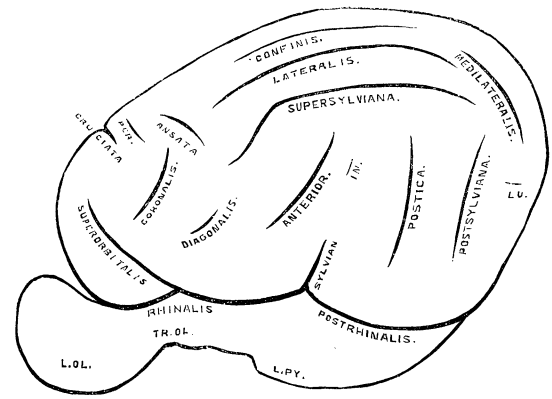


Fig. 1.

olfactorius; Fig. 2, the mesial aspect of the same, but as if viewed more from the cephalic region so as to expose the whole of the strongly curved fissura hippocampalis; hence the figure is somewhat foreshortened.

The constant fissures are shown as dark lines, the inconstant fissures as lighter lines. The f. olfactoria could not be shown upon these figures; it is a shallow groove upon the cephalic end of the hemisphere, and the lobus olfactorius rests in it.

The following abbreviations designate fissures: Ge.—Genualis; Ro.—Rostralis; Pmr.—Postmarginalis; Pr.—Postrhinalis; Pcr.—Postcruciata; Lu.—Lunata; In.—Intermedia. The name is placed above the fissure only in the case of the f. callosalis.

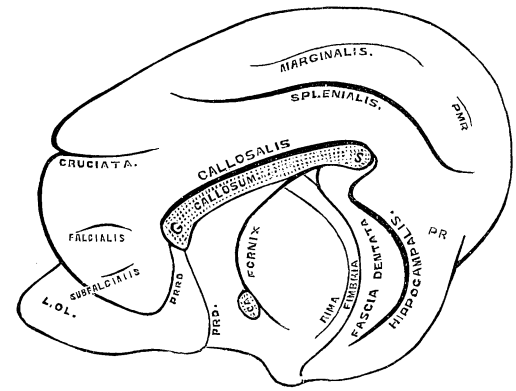


Fig. 2.

All of the names designate fissures, excepting the following names or abbreviations which refer to parts of the brain structure: Fornix; callosum—the corpus callosum; c. a.—the commissura anterior; rima—"the great transverse fissure;" fimbria—the corpus fimbriatum or taenia hippocampi; fascia dentata; S.—the splenium or caudal end of the callosum; G.—the genu or cephalic end; l. ol.—the lobus olfactorius; tr. ol.—the tractus olfactorius; l. py.—the lobus pyriformis.

The figures are diagrammatic, especially with reference to the structures represented upon the mesial surface; for instance the fornix is shown as a simple line.

[1] In the Museum of Comparative Zoology at Cambridge, Mass., is a series of 42 cats' brains, more than half of which are young or fœtal, forming part of a collection to illustrate the Neurology and Embryology of Domesticated Animals made by me for the late Professor Agassiz. In the anatomical laboratory of Cornell University each student prepares, draws and dissects two or more brains.

The lines represent what may be called the *fissural integers*, and only those junctions are shown which, so far as I know, are constant in the cat. These are of the rhinal with the postrhinal, and of the sylvian with the point of their union; of the superorbital with the rhinal; of the callosal with the hippocampal, and with the preradical when it exists.

The following junctions I have never observed: Of the splenial with the postrhinal; of the splenial with the cruciate, which Guillot has seen once, and Krueg twice. Neither have I seen the union of the anterior and posterior fissures to form the "first or lowest arched fissure" of the Canidae. On the contrary, as stated by Krueg (2,613), and by myself (11,229), this union sometimes fails with domestic dogs; hence, in this as in many other respects, the cat presents less tendency to vary.

The following junctions are common: Of the diagonal with the anterior; of the postsylvian with the supersylvian; of the medilateral with the lunate, and with the lateral or the confinis; of the marginal with the post marginal; and of the ansate with the lateral or coronal or both.

A junction is usually marked by a less depth of the compound fissure at that point, constituting a concealed "transition convolution" or "pli de passage," which may be seen by separating the sides or by slicing off the cortex.

The fissura ansata is represented by me as a slightly curved line nearly at right angles with the lateral and coronal, and rather nearer the former. It is true, as stated by Krueg, that the apparent form of the fissure is usually triradiate; but the variations are so great that no single figure would fairly represent them all, and in two brains I have found the condition of things shown in the figure. This fissure demands fuller investigation, especially with reference to its representation in the human brain.

The sylvian fissure in the cat does not present the complexity observed by Krueg in some dogs and in Ungulata, and the "Insula" is not distinguishable.

My paper will contain a *synonymy* of the fissures of the cat's brain, with full references to the page and figure upon which a fissure is named or represented. In some cases there are 25 entries under a single head, and I trust the lists may aid others in the identification of the fissures as described by different authors.

ABRIDGED SYNONYMY OF THE CEREBRAL FISSURES OF THE DOMESTIC CAT.

| Abbrev. | *Flower*, 1869. *Leuret*, 1839. *Huxley*, 1861, 1872. | *Owen*, 1868. | *Wilder*, 1873. | *Krueg*, 1880. | *Adopted in the present paper.* | |
|---|---|---|---|---|---|---|
| An | | | | Ansata | Ansata | An. |
| A. | | Ant. branch of ectosylvian | Ant. upright of ectosylvian. | Anterior | Anterior. | A. |
| C. | | Callosal | | | Callosalis | C. |
| Cf. | | Part of medilateral. | Part of medilateral | Confinis | Confinis | Cf. |
| Co. | | Coronal | Coronal | Coronalis | Coronalis | Co. |
| Cr | Crucial | Frontal | Frontal | Cruciata | Cruciata | Cr. |
| Di. | | | | Diagonalis | Diagonalis | Di. |
| Fl. | | Part of falcial | | Genualis | Falcialis | Fl. |
| H. | Hippocampal. Dentate, H., 1861 | Hippocampal | | Hippocampi | Hippocampalis. | H. |
| L. | | Lateral | Lateral | Lateralis | Lateralis | L. |
| Lu. | | | | | Lunata | Lu. |
| Ml. | | Part of medilateral | Part of medilateral | Medilateralis | Medilateralis | Ml. |
| Mr. | | Marginal | | Suprasplenialis | Marginalis | Mr. |
| Ol. | | | Ectorhinal | Olfactoria | Olfactoria | Ol. |
| Pcr. | | | | Postcruciata | Postcruciata | Pcr. |
| P. | | Post. branch of ectosylvian | Post. upright of ectosylvian. | Postica | Postica. | P. |
| Pmr. | | | | Postsplenialis | Postmarginalis. | Pmr. |
| Prd. | | | | | Postradicalis | Prd. |
| Pr. | | Part of ectorhinal | Part of rhinal | Rhinalis post | Postrhinalis | Pr. |
| Ps. | | Postsylvian | Part of supersylvian | Suprasylvii post | Postsylvianа | Ps. |
| Prrd. | | | | | Preradicalis | Prrd. |
| R. | | Part of ectorhinal | Part of rhinal | Rhinalis | Rhinalis. | R. |
| Sfl. | | Part of falcial | | Rostralis | Subfalcialis | Sfl. |
| Sp. | Callosomarginalis, (Fl. & H) | Supercallosal | | Splenialis | Splenialis | Sp. |
| So. | Supraorbital, (Fl) | | Presylvian | Præsylvii | Superorbitalis | So. |
| Ss. | | Supersylvian | Postsylvian & supersylvian. | Suprasylvii | Supersylvianа | Ss. |
| S. | Sylvian | Sylvian | Sylvian | Sylvii | Sylvianа | S. |
| In. | | | | | Intermedia | In. |

The foregoing is an abridgement of this synonomy limited to writers who have made special additions to the technical nomenclature, and excluding those who have employed phrases or vernacular names, or who have adopted the names of other writers in purely physiological papers. Notwithstanding the importance of the contributions of Flower, Huxley and Leuret, the technical names employed by them are so few that they may be given in a single column. It is due to Krueg to state that several of the names now given had been already used in his paper on the Ungulata, in which he included a diagram of a dog's brain.

The principles of anatomical nomenclature are hardly identical with those of taxonomy, but it seems right that priority should prevail excepting when the name implies an incorrect or doubtful homology, or is practically very objectionable. Hence, Owen's "Postsylvian" should not be displaced by Krueg's "Suprasylvi posterior," or his "marginal," by "su-

prasplenialis." Likewise, Flower's "supraorbital" has priority of my "presylvian," which Krueg has adopted. On the other hand, Krueg's "anterior" and "postica" are so much more usable than previous names as to be worthy of acceptance, especially as they may be regarded as abbreviations of the phrases by which Owen and myself designated the fissures in question. "Splenialis" also is to be preferred to "supercallosal" or "calloso-marginalis," so long as the human homologue of the fissure is uncertain. If *marginalis* be retained, *postmarginalis* will be better than "postsplenialis."

I am particularly gratified to find that Krueg admits as fissural integers the *ansata* and the *diagonalis;* the former I had intended to call *transversa*, and the latter *intermedia*, but Krueg's names must be retained. We agree also in regarding Owen's "medilateral" as composed of two fissures, which Krueg terms "medilateral" and "confinis." I had intended to leave Owen's name attached to the fissure which is really mesiad of the lateral, and to call the curved division *lunata*. I still think this would have been preferable; but as it is, the name *lunata* may be given to what would otherwise have been *sublunata*. I have applied the name *intermedia* to a fissure which Krueg mentions, but does not name.

Doubtless my readers, especially those who are especially interested in the physiological aspect of the subject, desire to learn the correspondence between the cat's fissures and those of monkeys and man. I hope that Krueg may shortly give us the benefit of his opinion. Meantime, I am obliged to admit my doubts with regard to all excepting the callosal, hippocampal, and olfactory; for the Sylvian is not yet fully understood. I believe that for a long time to come the most useful work will be done upon nearly related forms, and that each fissure should be monographed with respect to its constant and variable characters, its connections, its relations to internal structures or to more primary fissures, and especially its manner of formation.

List of papers and works referred to:

Krueg, J. (1). Ueber die furchung der grosshirnrinde der Ungulaten. Zeits. für wiss. Zool. xxxi, 297-345; 1878.

Meynert, T. Die windungen der convexen oberfläche des vorderhirns bei menshen, affen, und raubthieren. Archiv für psychiatrie, etc., vii; 1877.

Pansch, A. Beiträge zur morphologies des grosshirns der saügethiere. Morphologischen Jahrbuch, v, 1879.

Flower, W. H. (28). On the anatomy of the Proteles cristatus. Zool. Soc. Proc., 1869, 474-496.

Huxley, T. H. Manual of the comparative anatomy of the vertebrated animals.

Krueg, Julius. (2). Ueber die furchen auf der grosshirnrinde der zonoplacentalen saügethiere. Zeitschrift fur wissenschäftliche zoologie. xxxiii, 4 heft, 1880.

Leuret et Gratiolet. Anatomie comparée du système nerveux.

Owen, R. Comparative anatomy and physiology of vertebrates. Vol. iii.

Wilder, B. G. (11). The outer cerebral fissures of mammalia, especially the carnivora, and the limits of their homology. Amer. Asso. Proc., xxii, 1873, 214-234.

## CORRESPONDENCE.

*To the Editor of "Science:"*

Perhaps the following may interest the readers of "SCIENCE." It has always been my experience that a Black Snake, *Bascanion constrictor*, when confined with any other snake smaller than itself will invariably eat it. The following food has been eaten during the month of July, by a black snake five and a-half feet long, on exhibition at Central Park Menagerie: 3 leverits, 3 sparrows, 1 cat-bird, 1 small chicken, 1 black snake four feet long, 1 milk snake, 1 small rattlesnake; total weight, eight pounds.

W. A. CONKLIN,
Museum Building, Central Park.

## DEATH OF A NATURALIST.

WE have to record the death of Mr. Green Smith, of Peterboro, New York, son of the late Gerard Smith, whose name will ever be remembered by those who value the cause of human liberty.

For many years past Mr. Green Smith left no opportunity neglected by which he could add to his fine collections of the birds of the United States. On one occasion he gave $1000 for 240 specimens of humming birds, and probably spent from ten to fifteen thousand dollars in forming his unique collection.

As Mr. Green Smith purchased specimens, they were prepared and mounted by the well-known taxidermist, Mr. J. G. Bell, of New York City, who appears to have been consulted by Mr. Smith on all occasions.

During his life Mr. Green offered his collection to the Museum of Natural History in Central Park, on the condition that the collection should be kept intact, and should bear the name of the generous donor. The offer, however, was declined by the trustees, on the ground that such a condition was inconvenient, and established a precedent which it was not well to encourage.

We have reason to believe that such refusal has been long since repented of, and some hope is expressed that this fine ornithological collection may still find a home in the Central Park Museum.

A GERMAN naturalist, in the course of inquiries as to the phosphorescence of the sea, has found that the phenomenon occurs whenever sea-fishes are brought into a three per cent. salt solution. The luminosity begins apparently in the eyes, spreads over the whole fish, and increases day by day. The fish after some time seems luminous throughout. The phosphorescent substance is a kind of mucus which appears dirty-white by day, and shines in the dark.

THE electric light is at last to be put to a crucial test in the city of London. Tenders are to be asked for the illumination of the principal thoroughfares of the area bounded by Cheapside and the Thames, from Blackfriars to London Bridge; the three bridges from London, Southwark and Blackfriars, along with Queen Victoria street and Ludgate Circus to Cheapside, through King William street to London Bridge, with a cross line from Cheapside to Southwark Bridge. No doubt there will be sharp competition.