Anat. Labor. of Prof. H. SETO, Tohoku Univ., Sendai.

On the Course of Intrapontine Facial Nerve of Mammalia. II.

哺乳類橋内顔面神経の走行について. II.

Rikio SUGIMOTO, Kozo TANAKA, Morio KATO and Akio MORITA.

杉本力夫, 田中耕三, 加藤盛雄 と 森田昭夫.

(*Received October 22, 1955.*)

We have made a research on the subject with specimens of 20 animals belonging to the orders of Pitheci, Prosimii, Cetacea, Chiroptera, Insectivora, Edentata, Marsupialia and Monotremata as reported in our previous paper I of the same series and have obtained some new findings. We have found that the course of the intrapontine facial nerve fibres in those animals are not so complicated as in man, but neither so simple and schematic, as has been hitherto assumed, and that the position of the genu in particular is rather widely different in the various species, and have at the same time discussed the applicability of KAPPERS' neurobiotaxis theory in the light of these findings. Now, in this study of the same series, we have extended the same method of research to other species of animals, as follows:

As materials of our study, we selected the PAL-carmine stained series of brain sections of 19 mammals, namely, leopard, dog, sea bear, STELLER's sea lion, sea otter, striped hyena, Japanese fox, common seal, racoon dog, lion, American black bear, wolverene and cat (***Carnivora***), and house rat, squirrel, rabbit, procupine, Guinea pig and jerboa (***Rodentia***), in store at our laboratory.

Findings.

The intrapontine facial nerve of the above mammals emerge from the dorsal side of the facial nucleus comprise the first part, the genu and the second part in its course, but the fibres of the first and the second parts are not limited to such simple and schematic courses, as have been hitherto assumed, but many of them take various devious courses, as described hereunder. The genu is formed before the level of the caudal end of the abducens nucleus is reached, if we go on examining the series of slides from the caudal to the cranial levels, and continues in existence on the dorsal side of it up to its cranial end.

As given in our Report I, the position of the genu in the examined animal brains showed considerable difference from animal to animal and could be equally classified into three main types as follows:

Type I. In the animals of this type (leopard, dog, sea bear and Steller's sea lion), the genu is situated just dorsal to the central one-third of the abducens nucleus.

All the fibres of the first part of the nerve, after the appearance of the abducens nucleus, run along its lateral side to the dorsal and there come together with the genu and those of the second part run out lateralwards from the dorsal side of the cranial extreme of the nucleus (Fig. 1).

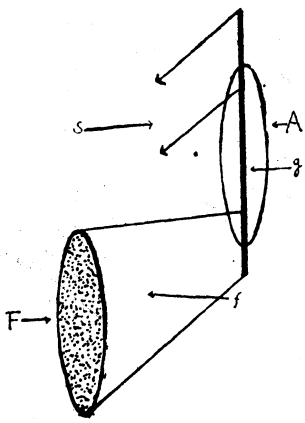

Fig. 1. Bird's-eye view of the course of the intrapontine facial nerve. *F* facial nucleus; *f* first part; *g* genu; *s* second part; *A* abducens nucleus (—— fibres running over the dorsal side of the nucleus; ---- ditto through the nucleus; ..... ditto along ventral side of the nucleus).

Type II. In this type, the genu is placed either a) dorsal to the lateral one-third of the abducens nucleus in transverse section or b) more lateral and quite outside the area directly dorsal to any part of the nucleus.

a) Sea otter, striped hyena, Japanese fox, common seal and racoon dog belong to this subtype. The fibres of their first part run into the dorsal side from the lateral side of the abducens nucleus after the appearance of the latter, to join the genu (Fig. 2).

b) In house rat, the genu is quite outside the area dorsal to the abducens nucleus on the lateral side, though the medial edge of the genu nearly touches the lateral borderline of this area. The first part joins the genu from the dorso-lateral side after the emergence of the abducens nucleus into view (Fig. 3).

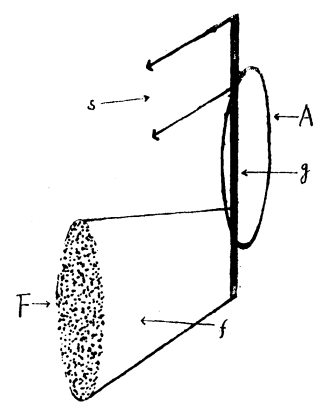

Fig. 2.

Type III. In this type, the genu is situated either a) just dorsal to the medial one-third of the abducens nucleus or b) more to the medial outside the entire area dorsal to the abducens nucleus in transverse section.

a) In American black bear, lion, rabbit, Guinea pig, wolverene and cat

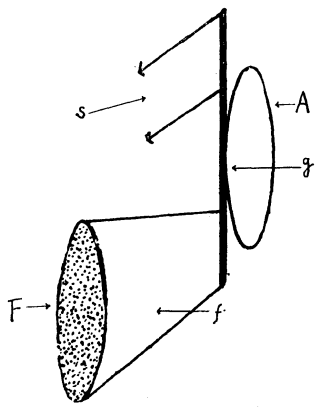

Fig. 3.

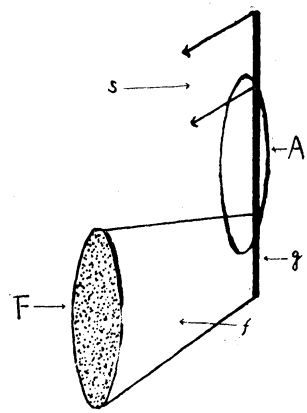

Fig. 4.

belonging to this type, the first part fibres, after the appearance of the abducens nucleus, show some variety in their courses by different animals. In American black bear and lion, all the fibres enter the genu running along the lateral side of the nucleus to its dorsal side (Fig. 4 and 5), but in rabbit, some of the fibres run through and some along the ventral side of the nucleus (Fig. 6), while in Guinea pig, wolverene and cat,

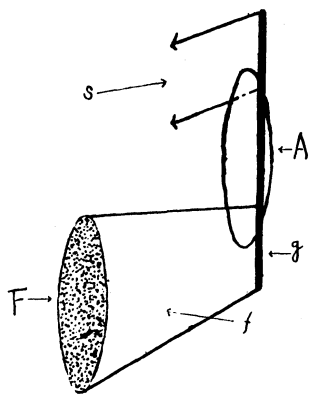

Fig. 5.

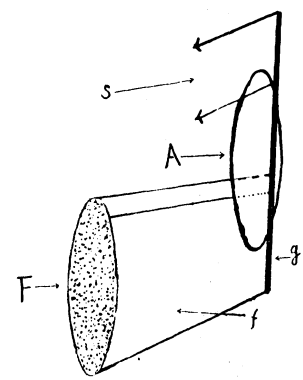

Fig. 6.

all the fibres run through the nucleus, after the appearance of the latter (Fig. 7).

The fibres of the second part, in American black bear, rabbit, Guinea pig, wolverene and cat, while the abducens nucleus still remains in view, run out laterally from the dorsal side of the nucleus (Fig. 4, 6 and 7), but in lion, all such fibres run right through the nucleus (Fig. 5).

Table 1.

Type I		Leopard (*Carnivora*) Dog (*Carnivora*) Sea bear (*Carnivora*) Steller's sea lion (*Carnivora*)
Type II	a	See otter (*Carnivora*) Striped hyaena (*Carnivora*) Japanese fox (*Carnivora*) Common Seal (*Carnivora*) Racoon dog (*Carnivora*)
	b	House rat (*Rodentia*)
Type III	a	American black bear (*Carnivora*) Lion (*Carnivora*) Rabbit (*Rodentia*) Guinea pig (*Rodentia*) Wolverene (*Carnivora*) Cat (*Carnivora*)
	b	Squirrel (*Rodentia*) Jerboa (*Rodentia*) Porcupine(*Rodentia*)

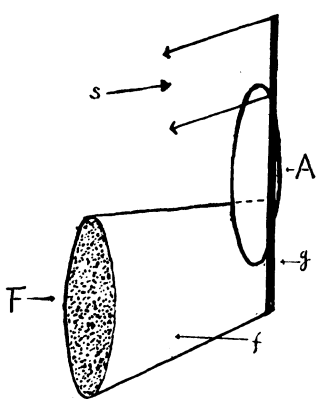

Fig. 7.

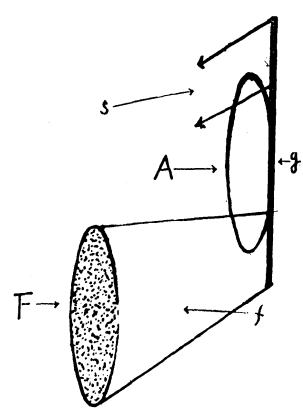

Fig. 8.

b) Squirrel, jerboa and porcupine belong to this type. The fibres of the first part always run along the lateral side to the dorsal of the abducens nucleus to join the genu, after the appearance of the nucleus, but those of the second part show some diversity of course. In sqirrel and jerboa, all the fibres of the second part, near the cranial end of

the abducens nucleus and while it is still in view, run from its dorsal side over it (Fig. 8), but in porcupine, run through the nucleus (Fig. 9).

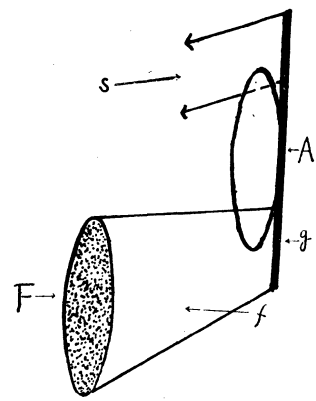

Fig. 9.

Discussion.

In our Report I on the same subject, we have found that the course of the intrapontine facial nerve is considerably variable in different animals, and in particular, we succeeded in establishing three types according to the position of the genu relative to the abducens nucleus. The Type III, in which the genu is placed more or less to the medial of the abducens nucleus was found to predominate over the other types, but there were a considerable number of cases that belonged to the Types I and II, where the genu was directly above or more lateral to the nucleus. As pointed out in our Report I, the solitary nucleus occupied nearly the same relative position in the brain of the animals examined in this study also, and we could find no evident difference in its morphological development in any case, so it seems difficult to explain the variable position of the genu by the traction due to the KAPPERS' so-called neurobiotaxis, in the teeth of such invariable position and much the same development of the solitary nucleus. The fact that regardless of the considerably wide difference of the position of the genu in Types II and III the facial nucleus occupies the same position in general on the lateral side at some distance from the pyramidal tract in all the animals can also hardly be explained on the strength of transposition due to neurobiotaxis.

The course of the intrapontine facial nerve in animals cited in our Report I was much simpler than that of man reported previously by YAMAMOTO, and the same can be said of the animals examined in this study, too. But yet, as described in the findings above, the first and the second parts are found to contain fibres taking varied courses and different animals showed sometimes quite a considerable difference in the courses of such fibres. Such a diverseness of courses is also inexplicable if neurobiotaxis should exert a uniform traction on such fibres. It is of some interest that animals belonging to the same order sometimes show positions of the genu falling under different types of our classification.

Summary.

1. The course of the intrapontine facial nerve was studied, with the brains of 19 species of animals belonging to the orders of Carnivora and Rodentia.

2. Of the position of the genu in relation to the abducens nucleus, we found the three types of its position, namely, directly above the nucleus (Type I), more lateral (Type II) and more medial (Type III) to it.

3. The courses of the first and the second parts of the nerve is far simpler than in man, but there are fibres in them that show diverse courses.

4. A considerable difference of the position of the genu was sometimes noted in different animals belonging to the same order.

内 容 自 抄.

私達は表題の研究Iに於いて猿類，擬猴類，鯨類，翼手類，食虫類，貧歯類，有袋類，及び単孔類に属する20種類の動物に就いて研究したが，1連の研究の続きとして食肉類（豹，犬，オットセイ，アシカ，ラッコ，ハイエナ，狐，海豹，狸，ライオン，アメリカ熊，クマテン，猫）及び齧歯類（家鼠，栗鼠，ジェルボア，モルモット，家兎，豪猪）に属する19種類の動物の橋内顔面神経の走行を観察し，研究Iと略々同様の知見を得た．

これ等動物の橋内顔面神経は顔面神経核の背面より発して第1部，膝，第2部を形成し，膝はすべて外転神経核出現以前に形成される．外転神経核出現後の第1部線維の走行は動物の種類によって異り，該核を外背側から包むもの，核内を貫通するもの及び貫通する線維と核を腹側から包む線維を混合するもの等があり，複雑である．膝が外転神経核の背側に位することは各動物に共通であるが，その位置は該核を基準にしてその中央に位する種類（豹，犬，オットセイ，アシカ），外側に位する種類（ラッコ，ハイエナ，狐，海豹，狸，家鼠）及び内側に位する種類（アメリカ熊，ライオン，家兎，モルモット，クマテン，猫，栗鼠，ジェルボア，豪猪）等があり，私達はこれを夫々I型，II型及びIII型として区別した．膝は外転神経核の上端で外方に方向を転じて第2部に移行する．外転神経核残存中第2部は一般に該核の背側を外方に走るが，1部分之を貫通する線維も認められる．

I型及びII型の動物の膝の位置はIII型の動物のそれより余程外側になっているにも拘らず，その孤束核は皆大体同じ位置を示し而も形態学的に発達の差異が認められない．

又II型とIII型では膝の位置がかなりの隔りをもつにも拘らず，その顔面神経核の位置は大体皆同じである．これらの事実は，第1部及び第2部の線維が一様でなく，色々異った走行を示す線維を含んでいることゝ共にKappers の neurobiotaxis 説では説明しがたい所見である．

食肉類及び齧歯類の橋内顔面神経の走行は研究Iでも論じたように，動物の種類によってかなりの相異を示し，人間のそれに較べれば遙かに単純であるが，然も尚色々の走行を示す線維を有してかなり複雑である．

References.

Kappers: Neurol. Zbl. 26 (1907). S. 834. — 27 (1908). S. 958. — The comparative anatomy of nervous system of vertebrates. Vol. 1. Macmillan, New York, 1936. — **Yamamoto**: Tohoku J. exp. Med. 55 (1952). P. 395. — 56 (1952). P. 331. — **Yamamoto, Tanaka, Sugimoto** a. **Matsuo**: Arch. hist. jap. In press.