

دراسات تشريحية مقارنة للعصب الفكي السفلي
للماعز والجمال في مصر

ج . م . بدوي ، م . الشايب

ملخص

اجريت الدراسة التشريحية المتسارئة لمنشأ ومسار وتفرعات العصب الفكي السفلي
في كل من الماعز والجمال على ثمانية رؤوس من كل نوع . وقد تم مقارنة ومناقشة النتائج
بالعصب الفكي السفلي في الحيوانات الاليفة الأخرى .

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COMPARATIVE ANATOMICAL STUDIES ON THE N. MANDIBULARIS OF CAPRINE AND CAMELUS DROMEDARIUS IN EGYPT.

(with 6 figures)

By

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SUMMARY

A comparative study of the origin, course and distribution of the mandibular nerve in the goat and camel has been carried out on 8 heads of both species. The results were discussed with the mandibular nerve of other domestic animals.

INTRODUCTION

The morphological description of the mandibular nerve of the goat and camel is lacking in the available literature contrary to that of the horse. In this respect little is mentioned for other domestic animals ELLENBERGER and BAUM (1943). BRADLEY (1947), KLUMOV and AKAEVSKI (1955), AKEVSKI (1968) and SISSON and GROSSMAN (1969). SESOIEV (1966) gave a brief description of the mansibular nerve of dog and similarly LESBRE (1903) of the cranial nerves of the camel, TAYEB (1957) reported that the cranial nerves of the camel resemble of ruminants. A few of the branches of the mandibular nerve were described such as the lingual nerve of man by SINILNIKOV (1963), of the sheep and dog by EL-SHAIEB (1971) and the mylo-hyoid nerve of cattle by LEOPOLD PETELA (1965).

MATERIAL AND METHODS

The course, relations and distributions of the branches of the mandibular nerve of goat and camel were studied in 8 heads of both species of the local breeds.

RESULTS

On its emergence from the foramen ovale, the mandibular nerve of the goat divides into a number of branches which may be grouped into a dorsal and a ventral group. The dorsal group includes the masseteric, deep temporal and buccal nerve, while the ventral one comprises the auriculo-temporal, mandibular alveolar, lingual and medial pterygoid nerves. In the camel such a division was not observed since the mandibular nerve supplies similar branches but continues its course as a common trunk for the lingual and mandibular alveolar nerves.

N. Massetericus .

In 50% of the examined specimens of the goat and in all specimens of the camel the masseteric nerve (2/2) arose in common with the deep temporal by a common trunk, the N. masticatorius which measured 2 mm. in length in the goat and 2 cm in length in the camel. In the latter animal the N. masticatorius (2/2.) passed dorsally through a foramen formed of fibrous tissue with a notch on the rostromedial aspect of the glenoid cavity of the petrous temporal bone. In the rest of the specimens of the goat in which the N. masticatorius was not found the masseteric nerve arose independently from the mandibular nerve. The masseteric nerve in both species passed dorsally then laterally rostral to the temporo mandibular articulation. In the camel it passed directly below the zygomatic arch, and in the goat it pierced the pterygoid muscle to reach the mandibular notch. Along its course to this notch it detached a collateral branch to the temporal muscle (2 branches in only one case in the goat) and an articular branch to the mandibular joint capsule. After traversing the mandibular notch, the masseteric nerve gained the lateral aspect of the ramus of the mandible where it entered in 2-3 branches in the deep face of the masseter muscle.

N. temporalis profundus :

The deep temporal nerve (2/3) is a small nerve which arose either separately or in common with the masseteric nerve as it has been previously mentioned. From its origin the deep temporal nerve curved dorsally and caudally, rostral to the temporo mandibular articulation in the goat, and dorsal to this joint in the camel, to ramify in the caudal part of the temporal muscle.

Mention has already been given to the innervation of that muscle by two rami from the masseteric nerve in a single case in the goat.

N. Buccalis :

The buccal nerve (2/4.) of the goat is the largest branch of the dorsal group of the mandibular nerve. At its origin it presented close to the foramen ovale a grayish enlargement the otic ganglion. In the camel the buccal nerve (5/3.) arose from the rostradorsal part of the mandibular nerve, it did not carry any enlargement, the otic ganglion) which was found on the medial pterygoid nerve. In both animals, the buccal nerve ran toward the maxillary tuber between the two pterygoid muscles. In the goat after it crossed that tuber, it proceeded along the lower border of the buccinator muscle being covered laterally by the masseter muscle.

The nerve then continued between the Mm. buccinator and depressor labii mandibularis in close relation with the ventral buccal glands to reach the lower lip into which it ramified. On the other hand the buccal nerve of the camel divided into dorsal, intermediate and ventral branches on the caudal part of the buccinator muscle at the level of the last molar tooth.

The dorsal branch (5/3') passed along the dorsal border of the buccinator muscle and beneath the zygomatic muscle it anastomosed with the dorsal buccal branch of the facial nerve. It detached several twigs to the dorsal buccal gland the mucous membrane of the cheek. The intermediate branch (5/3'') continues cranially on the middle part of the buccinator muscle, under the cutaneous muscle of the face, toward the labial commissure where it ended. Along its course it gave off several small twigs to the intermediate buccal glands and to the mucous membrane of the cheek and also a cutaneous twig which periced the cutaneous muscle at the middle of the cheek to end in the skin. The ventral branch (5/3''') continued the course the main nerve along the ventral border of the buccinator muscle, between it and the ventral buccal gland to end in the lower lip, after it detached several twigs to the ventral and intermediate buccal glands as well as to the mucous membrane of the cheek.

Along its course the buccal nerve detaches :

N. pterygoideus lateralis :

The lateral pterygoid nerve (2/5 ; 5/4.) was detached from the buccal nerve 0.5 - 1.5 cm. and about 2 cm. from its origin in the goat and the camel

respectively. It ran dorsally and rostralwards and just in front of the temporo-mandibular joint it divided into 3-5 twigs which ramified in the lateral pterygoid muscle and the rostral part of the temporal muscle.

— One to two rami were given at about 1.5 cm in the goat and about 3 cm. in the camel rostral to the origin of the previous nerve. These branches proceeded along the ventral border of the parent trunk toward the glosso-palatine arch into which it ramified.

— One to three rami were detached at the caudal portion of the buccinator muscle to the mucous membrane of the caudal half of the cheek and the dorsal and intermediate buccal glands.

— Several rami were given off in the goat as the buccal nerve lay between the M. buccinator and M. depressor labii mandibularis. These branches supplied the mucous membrane of the rostral parts of the cheek and the ventral and intermediate buccal glands, and in this respect it resembled the ventral branch of the buccal nerve of the camel.

— A ramus of considerable size was detached 2-3 cm. caudal to the angle of the mouth, in the goat passed dorsally towards the commissure of the mouth into which it ramified. This branch resembled the intermediate branch of the buccal nerve of the camel.

N. Auriculo-temporalis :

Shortly after its origin from the mandibular nerve and under cover of the parotid salivary gland, the auriculo temporal nerve (1/1) of the goat curved around the caudal border of the ramus of the mandible into the lateral surface of the masseter muscle for about 3-4 cm, then terminated into a dorsal and a ventral branch.

The auriculo temporal nerve detached close to its origin a branch that pursued dorso-caudally between the lobules of the parotid salivary gland. It was connected with the auriculo palpebral nerve and ended by dividing into a large and a small branch. The large branch divided into 2-3 twigs the Nn. auriculares rostrales which supplied the caudo-lateral aspect of the external ear, while the small branch passed dorsally, received a twig from the auriculo palpebral nerve, then continues towards the lateral aspect of the base of the external ear. It pierced the base of the conchal cartilage and continued its course within the external acoustic meatus as the N. meatus acustici externi which detached the Ramus membranae tympani to the

tympenic membrane. In addition several small twigs, Rami parotidei, and an articular branch to the temporo-mandibular joint capsule were given off from the parent nerve beneath the parotid salivary gland, and the Ramus transversus faciei at the caudal border of the ramus of the mandible.

The Ramus transversus faciei proceeded on the lateral surface of the masseter muscle close to the facial crest to end in the fascia of this region. The dorsal branch of the auriculo temporal nerve supplied 2 twigs, one of which ended in the fascia covering the zygomatic muscle, while the other ramified in the upper part of the cutaneous muscle of the face. The ventral branch of the auriculo temporal nerve crossed the dorsal buccal nerve and the transverse facial artery on its course to the ventral part of the cutaneous muscle of the face.

The auriculotemporal nerve of the goat or its ventral branch was connected with the dorsal buccal branch of the facial nerve by 1-2 very small twigs.

The auriculo temporal nerve (4/1.) of the camel had a similar course to that of the goat, its dorsal branch continues forward on the surface of the masseter muscle as the transverse facial nerve, while its ventral branch joins the dorsal buccal branch of the facial nerve, close to its origin, it is connected with the auriculo palpebral nerve by 1-2 anastomatic twigs.

N. Pterygoideus medialis :

The medial pterygoid nerve of either the goat or the camel was a small branch which was given off from the mandibular nerve medial to the common stem of the lingual and mandibular alveolar nerve. It passed ventrally to reach the caudal border of the medial pterygoid muscle into which it was expanded both laterally and deeply. The medial pterygoid nerve detached a very small twig to the otic ganglion which was found on the origin of the buccal nerve in goat as it has already been mentioned and associated with the origin of the medial pterygoid nerve in the camel.

N. Lingualis :

The lingual nerve of the goat (2/6) or that of the camel (5/5.) arose by a common stem with the mandibular alveolar nerve from the mandibular nerve. This common stem crossed the medial aspect of the maxillary artery

in its course ventrally and rostrally in the goat and the lateral aspect of that vessel in the camel. It then divided into the lingual and mandibular alveolar nerves. In 10% of the specimens of the goat the mylohyoid nerve was given off in addition from that trunk. In both species the chorda tympani (2/9, 5/6) of the facial nerve joined the lingual branch close to its origin (Ramus communicans cum chorda tympani).

The lingual nerve in its course to the tongue, ran firstly between the two pterygoid muscles, then between the medial pterygoid muscle and the ramus of the mandible and finally lay between the styloglossus and mylohyoid muscles and divided into a superficial and a deep branch. The lingual nerve of the goat and camel detached the following branches :

— A small branch at the rostral border of the medial pterygoid muscle which supplied 3-4 small twigs, Rami isthmi faucium, to the glosso palatine arch.

— Two to three rami 1.5-3 cm prior to its division, which also contained fibers from the chorda tympani nerve to the mandibular ganglion. This ganglion (2/12) was found in the goat close to the lingual nerve on the lateral aspect of the styloglossus muscle and in the camel in contact with the duct of the mandibular salivary gland. It was grayish, small in size and ovoid or irregular in shape in the goat, and fusiform in the camel. A very small nerve was given off from the caudal aspect of the ganglion which divided into a rostral and a caudal branch. The rostral branch (2/14) passed rostrally along the duct of the mandibular salivary gland to ramify in the sublingual salivary gland, while the caudal branch (2/13) continued caudally along the mandibular duct to end in the mandibular salivary gland.

— The superficial branch of the lingual nerve (2/6) is the smaller of the terminals, it ran rostrally on the lateral aspect of the styloglossus muscle along the duct of the mandibular salivary gland, then on the sublingual salivary gland. It supplied a twig to the sublingual salivary gland and ended in the mucous membrane of the floor of the mouth.

— The larger deep branch of the lingual nerve N. sublingualis (2/6'') crossed the lateral surface of the styloglossus muscle and the duct of the mandibular salivary gland and curved around the ventral border of the styloglossus; it was directed toward the apex of the tongue between the genioglossus and hyoglossus muscles. The N. sublingualis detached several

small branches, Rami lingualis, to the mucous membrane of the rostral 2/3 of the dorsum of the tongue. In addition several twigs, Rami communicantes cum N. hypoglosso, connected with twigs of the hypoglossal nerve in the musculature of the tongue.

N. alveolaris mandibularis :

The mandibular alveolar nerve (2/7 ; 3/1 ; 5/7 ; 6/1) left the common stem with the lingual nerve and followed a similar course to that of the lingual nerve to enter the mandibular canal. In all the camel specimens and in 90% of the goat cases the mandibular alveolar nerve supplied the mylohyoid nerve before its entrance into the mandibular canal. In the previous canal, the nerve gave off several Rami alveolares caudales et medii to the mandibular teeth and Rami gingivales to the gum. In the goat the mandibular alveolar nerve within the mandibular canal divided into 3-5 branches opposite the first molar tooth. The smallest branch of these, Ramus alveolaris mandibularis rostralis innervated the incisor teeth while the other 2-4 branches, Rami mentales (3/2) emerged through the mental foramen to ramify in a treelike pattern as Rami labiales mandibulares in the mentum and lower lip.

In the camel the mandibular alveolar nerve (5/7, 6/1) at the level of the last molar tooth within the mandibular canal gave off a large branch which ran rostrally along the main nerve, emerged through the caudal mental foramen located at the middle of the ramus of the mandible and joined the ventral buccal branch of the facial nerve (6/2). The combined nerve thus formed continued rostrally to ramify by several branches in the form of a tree in the caudal part of the lower lip and the ventral buccal glands. The parent nerve trunk then continued rostrally to leave the mandibular canal through the rostral mental foramen as a mental branch, Ramus mentalis (6/4), after it detached the Ramus alveolaris mandibularis rostralis to the incisor teeth. The mental branch ramified in a tree like manner, Rami labiales mandibulares, in the rostral part of the lower lip and the mentum.

Anastomosis occurred between the terminals of the Ramus mentalis and the ventral buccal branch of the facial nerve in the texture of the lower lip.

N. Mylohyoideus :

The small mylohyoid nerve (2/8 ; 5/8) originated from the mandibular alveolar nerve in all cases of the camel and goat, in 10% of the specimens

in the latter animal it arose from the common stem of the lingual and mandibular alveolar nerves. The mylohyoid nerve reached the mandibular space along the rostradorsal border of the rostral belly of the digastric muscle, and between that muscle and the mylohyoid muscle. In the goat the mylohyoid nerve continued in the texture of the mylohyoid muscle for a variable distance before its appearance superficially at the rostral third of the mandibular space to end as a cutaneous nerve in the region of the symphysis mandibulae. In the camel the mylohyoid nerve gained the rostral third of the mandibular space between the ramus of the mandible and the mylohyoid muscle to terminate in that muscle after it detached a cutaneous branch. The cutaneous branches of both sides joined together in the middle line of the mandibular space and proceeded to the symphysis mandibulae. Along its course the mylohyoid nerve of both animals detached 1-2 branches to the rostral belly of the digastric muscle as well as 2-4 branches to the mylohyoid muscle.

Ganglion oticum :

The otic ganglion appeared as a grayish enlargement at the origin of the buccal nerve in goat and at that of the medial pterygoid nerve in the camel on the lateral aspect of the M. tensor veli palatini. It was connected by Rami communicantes with the buccal nerve in both animals. Its shape was triangular, irregular or quadrilateral. The ganglion received the N. petrosus minor, a very delicate twig from the N. pterygoideus medialis and twigs from the sympathetic plexus around the A. maxillaris. The ganglion gave off N. tensoris veli palatini and N. tensoris tympani to the muscles of the same names as well as a delicate filaments to the auditory tube.

DISCUSSION

The present investigation showed that the masseteric and deep temporal nerves are detached by one common trunk (N. masticatorius) in all cases of the camel and in only 50% of the specimens of the goat, as it is described by SISSION GROSSMAN (1969) and by BARDLEY (1947) in the horse, by SESOIEV (1966) in the dog and by TAYEB (1957) in the camel. The N. masticatorius of the camel passed through a special foramen which was absent in both the horse and ox. The masseteric nerve supplies the capsule of the temporo mandibular articulation by a small twig in both the camel and goat, a condition which was reported by SESOIEV (1966) in the dog.

The deep temporal nerve was represented by one branch in both the goat and camel and by more than one branch in other domestic animals.

The division of the buccal nerve of the camel into 3 branches was also reported by TAYEB (1957). The anastomosis between the dorsal buccal branch of the facial and buccal nerve of the mandibular nerve in the camel is not similar to what occurs in the horse SISSON and GROSSMAN (1969) where the buccal nerve connects with the inferior buccal of the facial BRADLEY (1959) and SESOIEV (1966) reported that in the dog some of the branches of the buccal nerve join the plexus formed by the buccal nerves derived from the seventh cerebral nerve. As it is the case in all domestic animals the buccal nerve of the goat and camel gives off the lateral pterygoid nerve. AKAEVSKI the mandibular nerve.

The otic ganglion in the goat lied at the origin of the buccal nerve as in the horse SISSON and GROSSMAN (1969), but the ganglion in the camel was found at the origin of the medial pterygoid nerve as in the horse BRADLEY (1947) and AKAEVSKI (1968).

The ventral branch of the auriculo temporal nerve of the camel joined the dorsal buccal branch of the facial nerve as it was reported by TAYEB (1957) and as in the horse and Ox by SISSON and GROSSMAN (1969) and AKAEVSKI (1968) and as by SESOIEV (1966) in the dog. AKAEVSKI (1968) mentioned that no connection occurred between the auriculo-temporal and the facial nerves in the dog. This took place in the by 1-2 very small anastomotic twigs. Connection also occurred between the auriculo-temporal nerve and the auriculo-palpebral branch of the facial nerve in the camel and goat.

The distribution of the lingual nerve in the both species resembled that in the sheep and dog by EL SHAIEB (1971) and the connection between the lingual and hypoglossal nerves is also reported by the same author. FITZGERALD and LAW (1958) was reported the same findings in human, pig, cat, dog and rabbits.

The mandibular ganglion lied close to the lingual nerve before its division as it is the case in the sheep and dog by EL SHAIEB (1971). The origin of the mylohyoid nerve in the camel and in 90% of the cases in the goat was similar to that in horse, BRADLEY (1947) and SISSON and GROSSMAN (1969); but the nerve arose directly from the mandibular nerve according to AKAEVSKI (1968) in horse.

The course and distribution of the mandibular alveolar nerve of the goat were similar to those of other domestic animals. In the camel the pre-vius nerve gave off a large branch in the mandibular canal which established connection with the ventral buccal branch of the facial nerve after it emerges from the caudal mental foramen. This is supported by the findings of TAYEB (1957). An animal like the camel which is adaptable to live in the desert with its scorching heat, sand storms and dry tough plants needs a voluminous quantity of saliva which is accomplished by the presence of a well developed buccal glands, specially the ventral group, which richly receive blood and nerve supply. This explains the voluminous size of the buccal nerve and the presence of additional branch of the mandibular alveolar nerve.

According to KLUMOV and AKAËVSKI (1951) and Rommer (1955) the mylohyoid nerve supplies the mylohyoid muscle and the rostral belly of the digastric muscle. SISSON and GROSSMAN (1969), and LEOPOLD PETELA (1965) describe the presence of a cutaneous branch in the horse and in the cattle respectively. In this investigation the cutaneous branch of the mylohyoid nerve if the camel united with that of the other side to form one nerve unlike that of the goat which remain separate.

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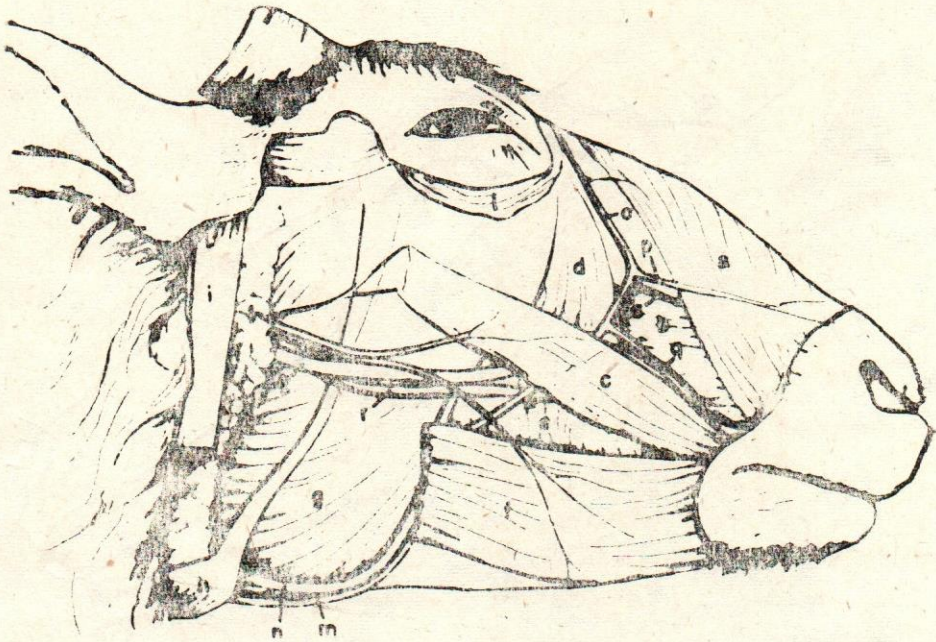


Fig. 1

SUPERFICIAL DISSECTION OF HEAD OF GOAT

- a. M. levator nasolabialis
- b. M. caninus
- c. M. zygomaticus
- d. M. malaris
- e. M. buccinator
- f. M. cutaneus faciei
- g. M. masseter
- h. M. sternomandibularis
- i. M. auricularis inferioris
- k. Gl. parotidis.
- l. Orbicularis oculi
- m. V. facialis
- n. Ductus parotidicus
- o. V. angularis oculi
- p. V. dorsalis nasi
- q. V. labialis maxillaris
- r. A. transversa faciei
- 1. N. temporalis auricularis
- 2. R. buccalis dorsalis of the N. facialis.

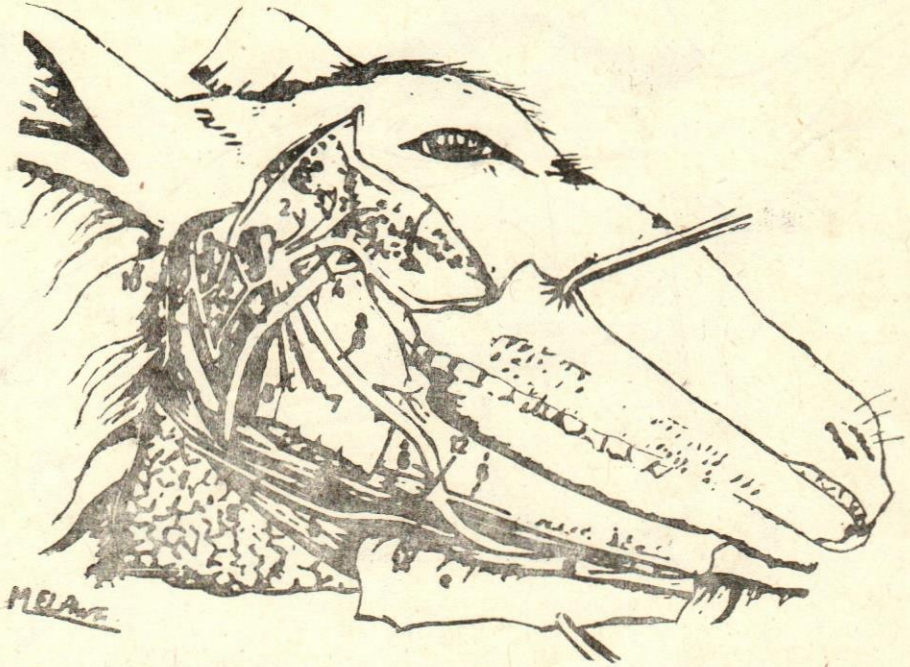


Fig. 2

DEEB DISSECTION OF HEAD OF GOAT

RIGHT RAMUS OF THE MANDIBLE HAS BEEN REMOVED

- | | |
|--------------------------------------|-------------------------------|
| a. M. pterygoideus medialis | 5. N. pterygoideus lateralis |
| b. Venter rostralis | 6. N. lingualis |
| b. Venter caudalis of M. digastricus | 6'. Its superficial branch |
| c. M. styloglossus | 6''. Its deep branch |
| d. M. geniohyoideus | 7. N. alveolaris mandibularis |
| e. M. mylohyoideus | 8. N. mylohyoideus |
| g. Ductus mandibularis | 9. N. chorda tympani |
| f. Gl. mandibularis. | 10. N. facialis |
| h. A. maxillaris | 10'. Its dorsal branch |
| i. Gl. Sublingualis. | 10''. Its ventral branch |
| 1. N. mandibularis | 11. N. auriculopalpebralis |
| 2. N. massetericus | 12. Ganglion manribularis. |
| 3. N. temporalis profundus | 13. Branch to mandibular s.g. |
| 4. N. buccalis | 14. Branch to sublingual s.g. |

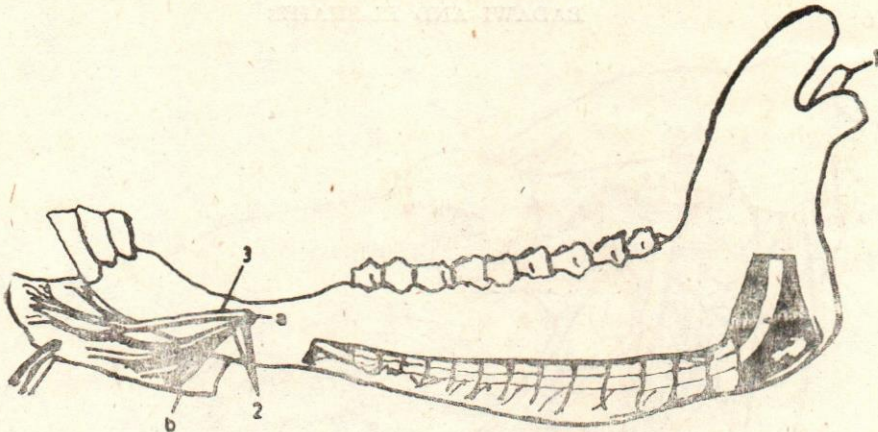


Fig. 3.
THE LOWER JAW OF GOAT
LATERAL VIEW

- | | |
|-----------------------|--------------------------------|
| a. For. mentale | 1. N. alveolaris mandibularis. |
| b. Part of lower lip. | 2. Ramus |
| | 3. R. incisivus. |

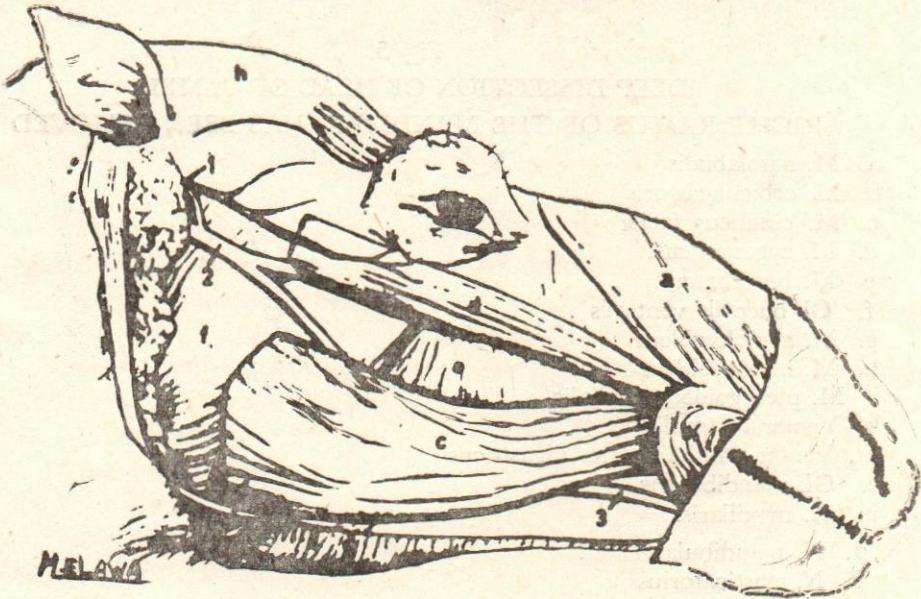


Fig 4.
SUPERFICIAL DISSECTION OF HEAD OF CAMEL

- | | |
|--|------------------------------|
| a. M. levator nasolabialis | f. M. masseter |
| b. M. orbicularis oris | g. M. mylohyoideus |
| c. M. cutaneus faciei | h. M. temporalis |
| d. M. zygomaticus | i. Parotid s.g. |
| e. M. buccinator | k. M. auricularis inferioris |
| 1. N. temporalis auricularis. | |
| 2. R. dorsalis of N. facialis. | |
| 3. Fused ventral buccal branch of the facial nerve with a branch from the mandibular alveolar nerve. | |

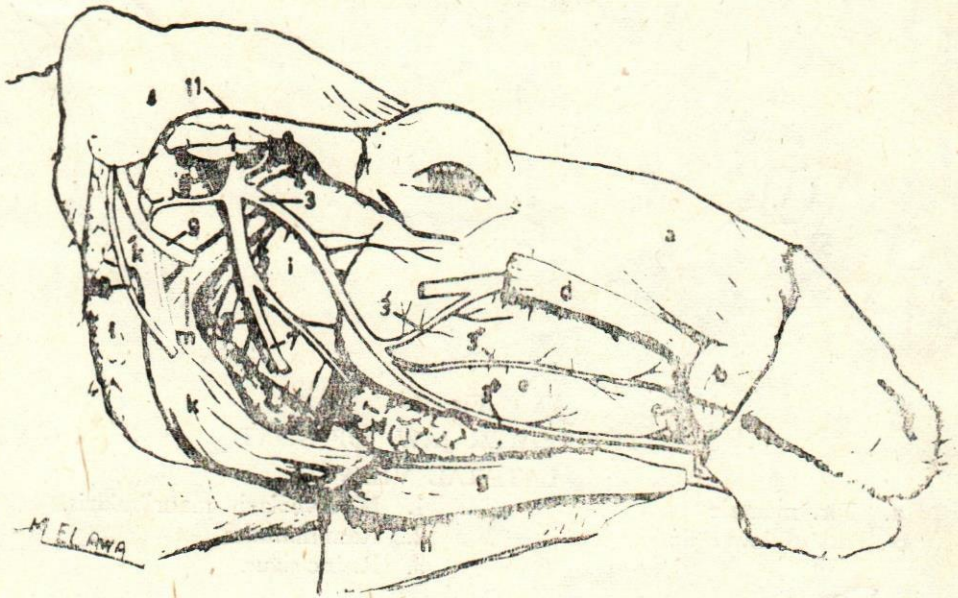


Fig 5.

DEEP DISSECTION OF HEAD OF CAMEL

RIGHT RAMUS OF THE MANDIBLE HAS BEEN REMOVED

- a. *M. nasolabialis*
- b. *M. orbicularis oris*
- c. *M. cutaneus faciei*
- d. *M. zygomaticus.*
- e. *M. buccinator.*
- f. *Gl. buccalis ventralis*
- g. *M. geniohyoideus*
- h. *M. mylohyoideus*
- i. *M. pterygoideus medialis*
- k. *Venter rostralis*
- k'. *Venter caudalis of m. digastricus*
- l. *Gl. mandibularis.*
- m. *A. maxillaris.*
- 1. *N. mandibularis*
- 2. *N. masticatorius*
- 3. *N. buccalis*
- 3' - 3'' - 3''' *Ils R. dorsalis, R. intermedius and R. ventralis.*
- 4. *N. pterygoideus lateralis.*
- 5. *N. lingualis.*
- 6. *N. chorda tympani.*
- 7. *N. alveolaris mandibularis.*
- 8. *N. mylohyoideus.*
- 9-10. *Dorsal and ventral buccal branches of the facial nerve.*
- 11. *N. auriculo-palpebralis.*

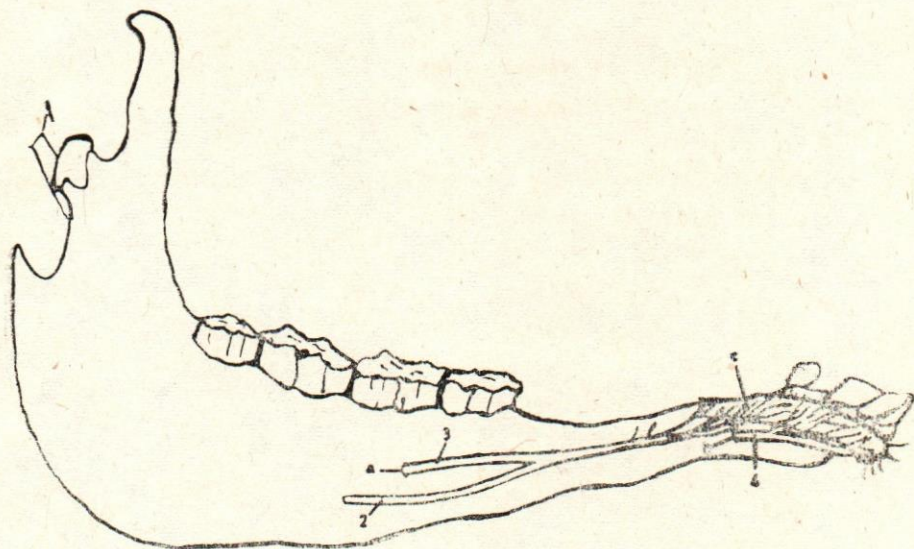


Fig. 6.

THE LOWER JAW OF CAMEL

LATERAL VIEW

- a. For. mentalis caudalis.
- b. For. mentalis cranialis.
- c. Part of lower lip.
- 1. Mandibular alveolar nerve.
- 2. R. buccalis vlntralis of N. facialis.
- 3. N. alveolaris mandibularis.
- 4. R. mentalis.