

## التوزيع التوبوجرافي للعصب الحائر في الجمل

د. محمد الشايب ، عبد الهادي محمد علي

### الملخص العربي

لقد تم اجراء هذا البحث على سبعة جمال ذات السنم الواحد وكذلك على خمسة أجنة من نفس النوع . وقد تم جمع المعلومات التفصيلية من هذه العينات عن التوزيع التوبوجرافي للعصب الحائر في كل من مناطق الرأس والعنق والصدر وكذلك البطن في الجمل بواسطة التشريح الدقيق .

وقد وجد أن العصب التينجري الأمامي والعصب التينجري الراجع في الجمل ينبعوا معا بجزع واحد من العصب التينجتر . كما أنه وجد أن العصب الجينجري الراجع بعد أن يعطى التينجري الخلفي يستمر كالعصب الراجع في الحيوانات الأخرى . كذلك تم الوصف التفصيلي لتوزيع كل من جزع العصب المريء الظهري والبطني على سطح معدة الجمل .

راہبوں کے ہاتھوں پر لکھی ہوئی خطبہ

یہ خطبہ ۱۷۱۹ء میں لکھا گیا ہے

خطبہ

بسم اللہ الرحمن الرحیم  
میں نے اپنے رب سے دعا کی ہے کہ وہ تمہیں سب کو  
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Dept. of Anatomy and Histology Faculty of Vet. Med. Assiut University,

Head Prof. Dr. H. Badawi

## INVESTIGATIONS ON THE TOPOGRAPHY AND DISTRIBUTION OF THE VAGUS NERVE OF CAMELUS DROMEDARIUS\*

( With 3 Figures )

By

M. El-Skaieb and Abd El-Hadi M. Aly

### SUMMARY

The present investigation was carried out on 7 adult and 5 foetuses of the one humped camel (*Camelus dromedarius*) from which a detailed knowledge on the topography and distribution of the vagus nerve in the head, cervical, thoracic and abdominal portions of the body in this species of animal was obtained by fine dissection. It was found that the vagus nerve of the camel detaches a common stem for N. Laryngeus cranialis and N. Laryngeus recurrens, the latter however after giving off the N. Laryngeus caudalis replaces the recurrent nerve in other domestic animals. The distribution of the dorsal and ventral oesophageal vagal nerve trunks on the stomach of the camel was also given in detail.

### INTRODUCTION

In the available literature only some brief remarks were recorded by LESBRE (1903) and DELLMAN, FAYEZ and HELMY (1965) on the autonomic nervous system and TAYEB (1957) on the vagus nerve of the camel. As the vagus nerve plays an extremely important role in controlling numerous visceral organs in the body, therefore this research work is carried out with the object of collecting sufficient and detailed knowledge about this nerve in the camel.

### MATERIAL AND METHODS

The present investigation was carried out on 7 adult and 5 foetuses of the one-humped camel (*Camelus dromedarius*) of different ages and sexes.

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\* Thesis presented for M.V.Sc, Assiut University by A.ALY (1975).

The adult camels were bled then fixed in the standing normal position with a 10% formalin solution injected through the common carotid artery. The fetuses were also preserved in the same solution.

The origin, course and distribution of the vagus nerve were examined by careful fine dissection. The nomenclature used in this work was adopted by the *Nomina Anatomica veterinaria* (1973).

## RESULTS AND DISCUSSION

The vagus nerve (1/1) of the camel originates by several rootlets from the lateral aspect of the ventral surface of the medulla oblongata, it emerges from the cranium through the foramen lacerum caudale and passes ventrally and caudally towards the neck. Near its origin it is connected to the cranial sympathetic ganglion with a few filaments. Here it is crossed laterally by the hypoglossal nerve.

It courses thereafter for a short distance caudal to the internal carotid artery in relation medially to the jugulohyoid muscle, the long muscle of the head and the dorsal extremity of the stylohyoid. On a level with the atlantoaxial articulation the vagus accompanies the cervical part of the sympathetic trunk in a dense fibrous sheath forming the vago-sympathetic trunk. This runs for a short distance medial to the mandibular salivary gland to gain the dorsolateral aspect of the pharynx where it descends on the dorsomedial aspect of the common carotid artery to the level of the sixth cervical vertebra. Here the common fibrous sheath becomes loose and the sympathetic trunk separated itself from the vagus nerve.

The vagus nerve detaches the following branches along its course in the head and neck regions :

### *Rami pharyngi*

The pharyngeal branches of the vagus nerve (1/2) are represented by two branches a larger and a smaller one. The larger branch arises from the ventral border of the vagus nerve 3 cm caudal to its exit from the foramen lacerum caudale. It passes backward and slightly downward crossing the lateral aspect of the cranial cervical sympathetic ganglion and the medial aspect of the internal carotid artery towards the dorsal aspect of the pharynx. Here the larger branch divides into two unequal cranial and caudal twigs. The cranial twig courses to the lateral aspect of the pharynx where it shares in the formation of the pharyngeal plexus. The caudal one gives off 8-9 small branches to the muscles of the pharynx and shares also in the formation of the pharyngeal plexus. DELLMAN et al. (1965) described only one pharyngeal branch in the camel.

The small pharyngeal branch ends in the wall of the pharynx and enters in the formation of the pharyngeal plexus.

*Common stem for N. laryngeus cranialis and N. laryngeus recurrens*

At the caudal end of the cranial cervical sympathetic ganglion the vagus nerve detaches a common stem for N. Laryngeus cranialis and N. Laryngeus recurrens (1/3) This common stem was named laryngo- oesophageal by LESBRE (1903) and laryngo-tracheal by TAYEB (1957)

*N. laryngeus cranialis*

The cranial laryngeal nerve (1/4) passes ventrally and slightly caudal on the lateral wall of the pharynx crosses the medial aspect of the common carotid artery and enters the larynx where it ramifies and gives off Ramus communicans cum N. laryngeus caudale .

*N. laryngeus recurrens*

The laryngo- recurrent nerve (1/5) descends in the neck, at first on the lateral aspect of the pharynx and larynx, and then between the oesophageus and trachea replacing the recurrent nerve in other domestic animals. On entering the thoracic cavity the nerve courses between the oesophageus and the brachiocephalic artery to terminate with sympathetic fibers originating from the third, fourth and fifth thoracic sympathetic ganglia and trunk in a plexus found medial to the aortic arch . The plexus supplies several twigs to the oesophageus, trachea and lungs. Along its course the laryngo-recurrent nerve detaches the caudal laryngeal, tracheal and oesophageal branches . Anastomosis between the left and right laryngeorecurrent nerves are observed at the middle and caudal parts of the neck as well as at their thoracic parts.

*N. laryngeus caudalis*

The caudal laryngeal nerve (1/6) leaves the laryngeorecurrent nerve on a level with the cranial extremity of the thyroid gland, which it is partially covered. It supplies oesophageal and tracheal branches and then terminates in several branches for the muscles of the larynx. Within the larynx it receives the R. communicans cum N. Laryngeus caudale from the cranial laryngeal nerve .

The above mentioned findings are also reported by DELLMAN *et al.* (1965).

*The thoracic part of the vagus nerve*

At the entrance to the thorax the vagus and sympathetic nerves become separated from each other. The right vagus nerve enters the thorax medial to the right subclavian artery and runs caudalward and slightly upward on the right side of the trachea to reach its dorsal aspect at the bifurcation of the trachea, it divides into dorsal (1/8) and ventral (1/9) branches which occasionally unite with each other ,

The left vagus nerve gains the thorax ventrolateral to the left subclavian artery. It passes caudalwards on the lateral aspect of the aortic arch and oesophagus and, on reaching the left bronchus, divides also into dorsal and ventral branch.

Both right and left vagi detach several branches to the heart, large blood vessels, lungs, oesophagus, trachea and the bronchi.

At the level of the 8th intercostal space, the dorsal branches of both vagi unite together to form the dorsal oesophageal nerve trunk (1/11, 2/1). Similar findings in the camel were reported by DELLMAN *et al.* (1965). Such a union occurs on a level with the 7th thoracic vertebra in the cow, sheep and kid (HABEL, 1956) and midway between the aortic arch and the diaphragm in the buffalo MOUSTAFA and FAHMY, 1968).

On a similar line the ventral oesophageal nerve trunk (1/10, 2/8) is the result of union of the ventral branches at the bifurcation of the trachea at the level of the 6th rib. This is in accordance with the findings of DELLMAN *et al.* (1965).

The ventral oesophageal nerve trunk begins at a level cranial to the dorsal oesophageal trunk in the buffalo (MOUSTAFA and FAHMY, 1968), in bovines (Foust, 1929) and immediately caudal to the bifurcation of the trachea in the cow, sheep and kid (HABEL, 1956).

The dorsal and ventral oesophageal nerve trunks run on the corresponding aspects of the oesophagus and traverse the oesophageal hiatus. Along their course they are connected by 2-3 communicating branches and detach several oesophageal twigs which were not mentioned by DELLMAN *et al.* (1965).

*Dorsal vagal Nerve Trunk (Truncus vagalis dorsalis)* The dorsal oesophageal nerve trunk (1/11, 2/1) continues along the abdominal portion of the oesophagus to the ventricular atrium where it divides into several branches which may be described as a dorsal and an intermediate group and a single ventral branch.

The component nerves of the dorsal group run in a caudal direction along the right dorsal aspect of the rumen and include the following branches :

*Dorsal Ruminal Branches (Rami ruminalis dorsales)* (2/2) are represented by 1-3 branches which ramify in the right dorsal wall of the rumen. A small branch joins the left coeliacomesenteric ganglion.

With the exception of the small anastomotic branch to the left coeliacomesenteric ganglion similar branches from the dorsal oesophageal trunk were described by DELLMAN *et al.* (1965), in the camel. Corresponding nerves are also distributed to the dorsal ruminal wall in the buffalo (MOUSTAFA and FAHMY, 1968), in bovine (Foust, 1929, SISSON and GROSSMAN, 1969) and in the cow, sheep and kid (HABEL, 1956).

*Ruminal Atrial Branches (Rami atriales rumines)*

The atrial ruminal branches (2/3) proceed towards the ventricular atrium to form a plexus with twigs from the ventral oesophageal nerve trunk. This plexus gives off several small twigs to the ventricular atrium, a branch of some size to the craniodorsal glandular sac and to the left ventral wall of the rumen. DELLAN *et al.* (1968) gave no reference as to the presence of either atrial ruminal branches or to the formation of a plexus by their union with the ventral oesophageal nerve trunk.

*Coeliac Branches (Rami celiaci)*

The coeliac branches (2/4) comprise 3-4 twigs which run along the right dorsal aspect of the rumen to end in the right and left coeliacomesenteric ganglia. The left coeliacomesenteric ganglion receives, in addition, a branch from the dorsal ruminal branches reference of which has already been mentioned. Mention may be given to the occasional union of one of these branches with a branch from the coeliacomesenteric ganglion to contribute to the nerve supply of the liver.

*Visceral Gastric Branches (Rami gastrici viscerales)*

The visceral gastric branches (2/5) consist of 1-2 branches which accompany the left gastric artery and together with branches from the coeliacomesenteric ganglia ramify in the wall of the cranio-dorsal glandular sac of rumen, the reticulo-omasal junction and the visceral surface of the wide part of the omasum. Although DELLLMAN *et al.* (1965) described the innervation of the dorsal ruminal sacs with branches from the dorsal oesophageal nerve trunk, they did not state whether these branches include what are here described as visceral branches. However, FOUST (1929) described in bovines and HABEL (1956) in the cow, sheep and kid the presence of these visceral gastric branches.

The intermediate group of nerves comprises :

*The caudal Reticular Branches (Rami reticulares caudales) :*

These (2/6) are 3-4 branches which pass caudo-ventrally on the right side of the caudal portion of the reticulum. They ramify in the wall of the reticulum and the adjacent part of the rumen including the ventral glandular sac.

*The ventral Branch*

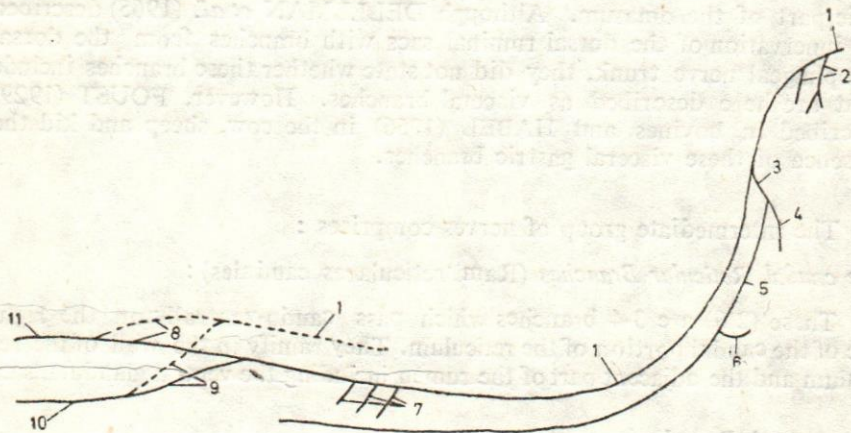
The ventral branch or the visceral omaso-abomasal branch (*Ramus omaso-abomasialis visceralis* (2/7) runs at first on the right side of the rumen then along the cranial part of the lesser curvature of the reticulum. On reaching the reticulo-omasal junction it curves backward and continues its course along the lesser curvature of the omasum and abomasum and ends at the duodenal ampulla (*Ampulla duodeni*). It gives off reticular branches

to the cranial portion of the reticulum and the reticulo-omasal junction, omasal branches to the omasum, visceral abomasal branches to the abomasum and duodenal ampulla (Rami reticulares, omasiales and abomasiales viscerales).

*Ventral Vagal trunk (Truncus vagalis ventralis)*

Reference has already been given to the entrance of the ventral oesophageal vagal nerve trunk (1/10, 2/8) into the abdominal cavity through the oesophageal opening along the ventral aspect of the oesophagus. After it detaches parietal gastric branches (Rami gastriciparietales) (2/9) to the cranio-dorsal glandular sac area and the left ventral aspect of the rumen and ruminal atrial branches (Rami atriales ruminis) (2/10) to the Atrium ruminis it passes caudo-ventrally on the cranio-dorsal part of the lesser curvature of the reticulum, the reticulo-omasal junction and the parietal surface of the omasum and abomasum to end at the duodenal ampulla. Along its course caudo-ventrally it detaches cranial reticular, omasal, parietal abomasal, duodenal and hepatic branches (Rami reticulares craniales (2/11), omasiales (2/12, abomasiales parietales, (2/13) duodenales (2/14) et hepatici).

DELLMAN *et al.* (1965) described in the camel a number of unnamed branches which correspond in their distribution to those already described as branches of the ventral oesophageal vagal trunk MOUSTAFA and FAHMY (1968), FOUST (1929) and HABEL (1956) mentioned similar branches to the same parts of the stomach in ruminants. GROSSKOPF (1965) however, described similarly named branches distributed to the stomach of Merino-sheep.



(Fig. 1)

Diagram showing the vagus nerve and its branches in the camel 1. Nn. vagi, 2. Rami pharyngi 3. Common stem for N. laryngeus cranialis and N. laryngeus recurrens 4. N.

Laryngeus cranialis 5. N. laryngeus recurrens 6. N. laryngeus caudalis 7. cardiac branches 8. dorsal branches 9. ventral branches 10. truncus vagalis ventralis. 11. Truncus vagalis dorsalis.



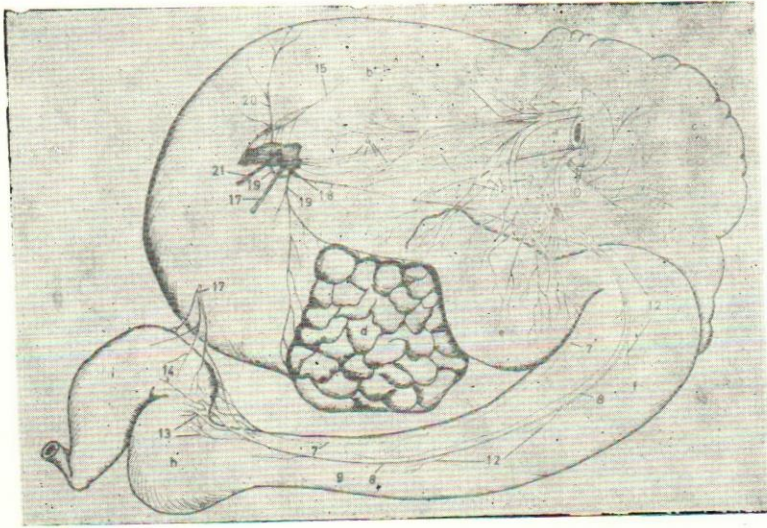
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- Author's adress Dr. M. El-Shaied. *Fac. of Vet. Med.*

*Assiut Uninersity. Dept. of Anatomy.*



## VAGUS NERVE OF CAMEL

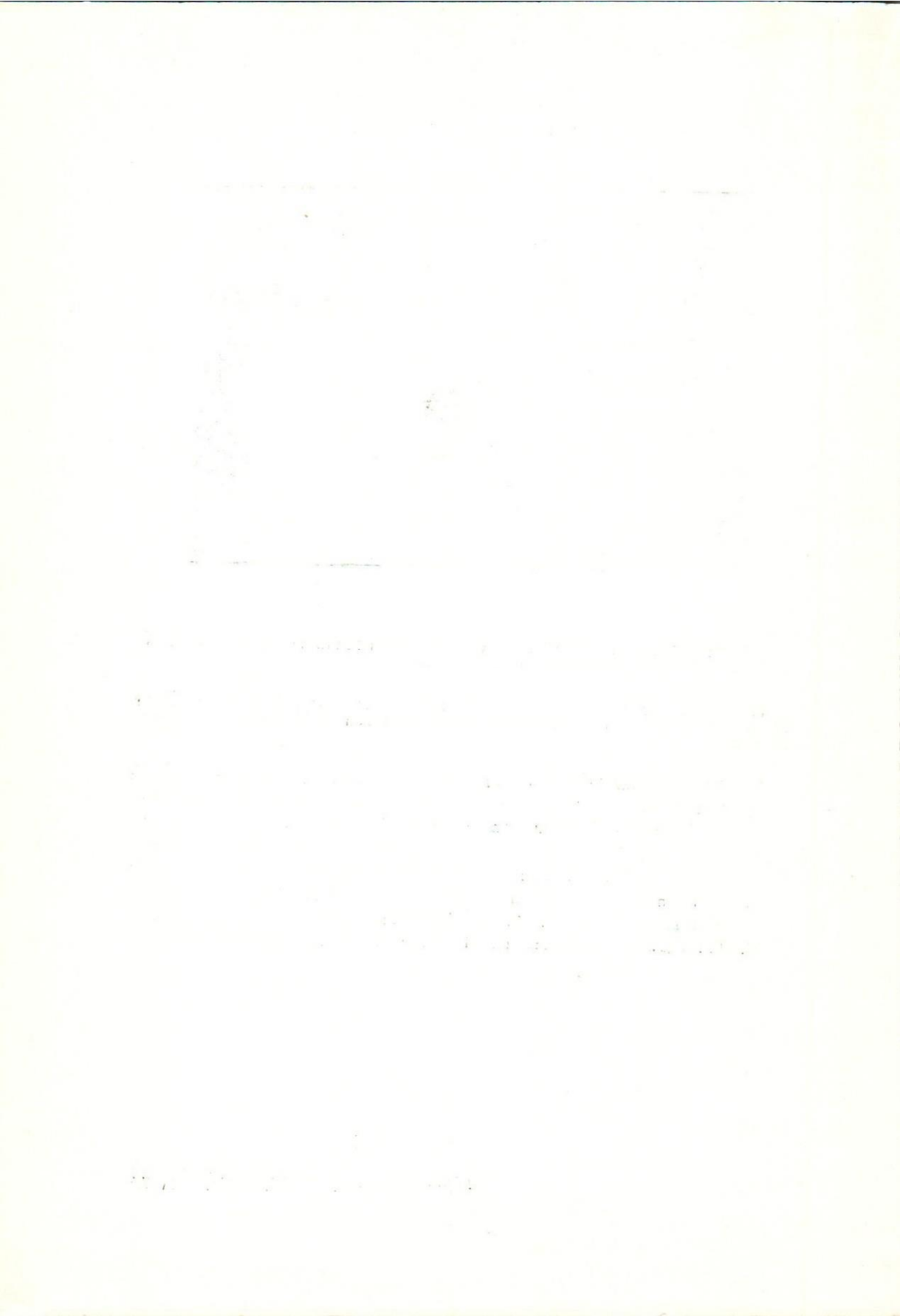


(Fig 2)

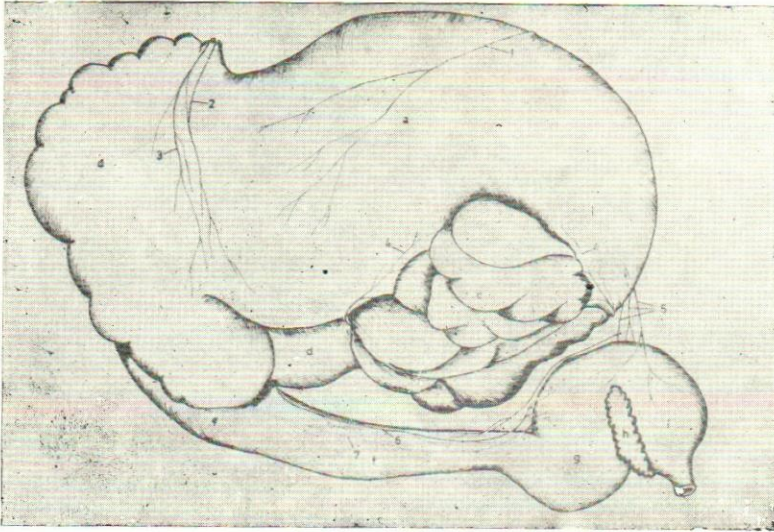
Diagram of the right side of the stomach of the camel showing the distribution of the dorsal and ventral oesophageal vagal nerve trunks.

(a) Oesophagus (b) Rumen (c) craniodorsal glandular sac area (d) Ventral glandular sac area (f) wide part of omasum (g) Tubular part of omasum (h) Abomasum (i) Duodenal ampulla.

1. Truncus vagalis dorsalis 2. Rami ruminales dorsales. 3. Rami atriales rumines
4. Rami celiaci 5. Rami gastrici viscerales 6. Rami reticulares met truncu vagalis dorsalis 7. Ramus omaso abomasialis visceralis. 8. Truncus vagalis ventralis 9. Rami gastrici parietales 10. Rami atriales ruminis met truncus vagalis ventralis. 11. Rami reticulares craniales met truncus vagalis ventralis
12. Rami omasiales 13. Rami abomasiales 14. Rami duedenales 15. N. splanchnicus major 16. Ganglia Coeliacomesentrica 17. Plexus hepaticus
18. Plexus gastrici 19. plexus ruminalis dexter 20. plexus ruminalis sinister.



## VAGUS NERYE GF CAMEL



(Fig. 3)

Diagram of the left side of the stomach of the camel showing the distribution of the dorsal and ventral oesophageal nerve trunks.

(a) Rumen (b) Cranio-dorsal glandular sac area (c) Ventral glandular sac area  
(d) Reticulum (e) Wide part of omasum (f) Tubular part of omasum (g) Abomasum  
(h) Pancreas (i) Duodenal ampulla.

1. Plexus ruminalis sinister 2. Branch from Rami atriales rumines met truncus vagalis dorsalis 3. Branch from Rami gastrici parietales met truncus vagalis ventralis. 4. Branches from plexus ruminalis dexter. 5. Branches from plexus hepaticus 6. Ramus omaso-abomasialis Visceralis 7. Continuation of the truncus vagalis ventralis.

