

GALEN AND THE THYMUS GLAND

by Professor A. J. E. Cave

MODERN anatomical nomenclature eschews eponyms, with the avowed object of providing the medical student with a uniform, readily intelligible and more informative terminology, and from the purely utilitarian viewpoint there is doubtless some justification for such a procedure. But a defect of the new nomenclature is that it deprives the student of that almost unconscious introduction to the venerable history of anatomy which the older terminology afforded. Enquiry into that history proves educatively rewarding and serves to remind the student that he is no mere technologist but a potential member of a learned profession, founded in antiquity.

Perhaps under any system of nomenclature the medical student might legitimately be expected to evince some curiosity as to the meaning of the anatomical terms he employs, if only because language is the tool of thought and anatomical nomenclature is primarily designed to be at once definitive and descriptive. It is a wholesome and profitable exercise to seek to discover why particular anatomical structures bear the names they do. Not to be acquainted, in some measure at least, with the derivation and meaning of anatomical terms is both an intellectual defect and a handicap in study. Sometimes the anatomical term is obvious or self-evident (e.g. **pancreas**, **sublingual gland**), but at other times its significance must be sought in history (e.g., **thyroid**), in metaphor (e.g., **acetabulum**, **tibia**) or elsewhere (e.g., **falx**, **sesamoid**).

One anatomical term which seems, at first sight, singularly inappropriate is that of **thymus** for the well-known gland of that name, and this notice purports to show how such an essentially botanical term came to be applied descriptively by Galen to the solid, fleshy mammalian gland and how the very adoption of such a term constitutes intrinsic evidence of the assiduity of Galen's anatomical researches.

Since, however, the modern student is unacquainted with the **vena magna Galeni**, etc., of the Old Terminology, Galen himself may require some introduction and something may need to be said regarding his place and significance in the history of anatomical science.

The earliest people systematically to explore the interior of the human body, and thus to acquire a first-hand acquaintance with its several organs and parts, were the Ancient Egyptians, whose distinctive religious beliefs necessitated the preservation of the eviscerated corpse by an elaborate process of mummification. The technical details of this process— itself but a part of an extensive magico-religious ceremonial—varied at different historical periods and are irrelevant here. But they involved the removal of all the thoraco-abdominal contents, save the heart, through a flank incision some 80-90 mm. long, a manipulation impossible of performance without a detailed knowledge of the position, relationships and mutual attachments of the internal organs, certain of which, after removal, were themselves embalmed for ultimate interment. Mummification was carried out continuously over a period of some 3,000 years, resulting inevitably in the establishment of a unique corpus of anatomical knowledge. The internal organs were named and were recognized to correspond to their animal counterparts: this earliest anatomical nomenclature was most likely akin to that of modern butchery, wherein the thyroid is the throat gland, the pancreas the sweetbread, and so on. It was not inherently scientific, for the ancient embalmers were concerned not to study human morphology, but to prepare the cadaver for permanent preservation. Nevertheless Egypt was the cradle of anatomical science, itself the child of Greek intellectual curiosity. For in the then civilized world Egypt alone possessed an exclusive and traditional knowledge of human morphology; she had been, for centuries, unprejudiced against manipulation of the cadaver, and offered unrivalled opportunity for a nicer exploration of man's physical structure. Hence the rise, in the 3rd century B.C., of the "Alexandrians", i.e. those early Greek anatomists who found in the Egyptian metropolis an exceptional field for enquiry and who there established the foundations of anatomy as a scientific discipline. Their endeavours were aided (perhaps even made possible) by the curious decadence which, at this relatively late period in Egyptian history, befell the embal-

mers' craft: for examination of mummies of this period demonstrates conclusively that (for whatever reason) the most cursory attention was now bestowed upon the cadaver in contradistinction to the elaborate care devoted to its wrappings, coffin and funerary equipment. Unmistakable evidence indicates that, during embalment, the cadaver might suffer partial decomposition or might disintegrate, to be re-assembled most haphazardly.

Such a state of affairs, however otherwise deplorable, provided the "Alexandrian" Greek anatomists with wholly exceptional opportunities for anatomical investigation, opportunities which they profitably seized.

[The "Athenians" of the 4th Century B.C. (Hippocrates, Diocles, Aristotle) must be dismissed from present consideration. Although their tradition doubtless reflected something of Ancient Egyptian medical knowledge, and though Diocles (d.350 B.C.) wrote works (since lost) "On Anatomy" and "On the Heart", there is no evidence that they dissected the human body and no probability that they did.]

The pioneer "Alexandrians" were Herophilus of Chalcedon (c.300 B.C.), the father of scientific anatomy, and Erasistratus of Chios (d.290 B.C.), the first experimental physiologist. Herophilus distinguished cerebrum from cerebellum, arteries from veins and motor from sensory nerves; he described and named the meninges, the cerebral aqueduct, the confluens sinuum (Old Terminology **torcular Herophili**), the hyoid bone, the parotid and submaxillary glands, the duodenum, the ovary, the uterine tube, the prostate, the seminal vesicles and the retina, vitreous and ciliary body.

Erasistratus named the aorta, the tricuspid, aortic and pulmonary valves, many of the principal arteries, the caval, renal, pulmonary and hepatic veins and the chordae tendineae, besides describing the superficial origin of the cerebral nerves.

Both obviously had a direct personal familiarity with human structure, but their Alexandrian successors had perforce to confine themselves to animal anatomy alone. For though during the first two centuries of our era Alexandria remained the cultural centre of the world it no longer provided the Greek anatomists, whom it still attracted, with any opportunity for exploration of the human body. Mummification had been abandoned, with the ancient religious beliefs of Egypt.

The later "Alexandrians" included Rufus of Ephesus (1st cent. A.D.), who wrote the first treatise on anatomical nomenclature, Soranus of Ephesus (2nd cent. A.D.), Marinus of Tyre, Quintus, Numisianus of Corinth, Satyrus of Pergamum, Pelops of Smyrna, and Lycus. The **Onomasticon** of Julius Pollux (134-192 A.D.) introduced such still current anatomical terms as **amnion**, **atlas**, **axis**, **cricoid**, **canthus** and **tragus**.

The great Galen was born at Pergamum (c.130 A.D.). His is the last great name in antiquity, to the medical knowledge and scientific achievements of which he remains the portal. His anatomical reputation, his physiological hypotheses and his immense authority in matters clinical, were to dominate Medicine for centuries, until, indeed, the rebirth of anatomy in the Vesalian age. He had studied anatomy under Satyrus at Pergamum, under Pelops at Smyrna and under Numisianus at Corinth and later at Alexandria. Settling in Rome in 162 A.D., he ultimately became physician to Commodus and to Marcus Aurelius, and in Rome (176 A.D.) he delivered public lectures on anatomy. Traveller, physician, physiologist and anatomist, an indefatigable worker and a prolific author, Galen was familiar with the anatomical work of his predecessors (Marinus' lost anatomical works are known only from Galen's references), which, reinforced by his own additions to knowledge, he transmitted to posterity.

In anatomy Galen excelled in neurology, myology and arthrology. He distinguished the dura from the pia mater, systematized the cerebral nerves (into seven pairs), wrote impressively upon the cerebral ventricles, corpus callosum, fornix, colliculi, hypophysis and upon the internal cerebral vasculature. His **Encheiresis** was the earliest treatise on (animal) dissection and he introduced into anatomy a host of terms which remain valid to this day. These include **epiphysis**, **diaphysis**, **apophysis**, **symphysis**, **diarthrosis**, **enarthrosis**, **gomphosis** and **suture**. Another term is that of **thymus** for the glandular organ so known, whose exact function still awaits final determination. With Galen's death (c.200 A.D.) anatomical enquiry ended, and was not to be resumed until the 16th century.

The thymus gland in the pigs and oxen dissected by Galen is, on inspection, the customary fleshy, solid, bipartite organ situate ventral to (sometimes cranial of) the pericardial sac and occasionally manifesting extensions in-

to the lower cervical region. To such an organ the term *pancreas* might seem ideally applicable, yet Galen deliberately applied to it the botanical term *thymus* (θύμος). (Taxonomically the wild thyme plant is *Thymus serpyllum*, the cultivated plant is *Thymus vulgaris*.)

At first sight there is no apparent resemblance between the homely thyme plant and the solid, compact thymus gland, and one might wonder what prompted Galen to apply the botanical term to the mammalian organ. This problem of nomenclature is not to be resolved by reference to the descriptive accounts of the thymus gland in anatomical or veterinary treatises, which confine themselves to the topography, embryology and general features of the organ as a whole and then pass to an immediate consideration of its microscopical structure.

If, however, time and labour be expended upon a meticulous dissection of the ungulate thymus, there ensues a surprising and very beautiful picture of its true constitution, and the aptness of Galen's name for the organ is shown to be fully justified. For when all the dense supportive connective tissue has been carefully removed the fully dissected thymus is seen to bear a remarkable resemblance to a plant or shrub whereof the stems are the thymic bloodvessels and the leaves are the unitary lobules of the thymic parenchyma.

The fully dissected thymus gland of a young rhinoceros (*Diceros bicornis*) is depicted in the accompanying figure, which illustrates the singular appropriateness of Galen's descriptive

term for the mammalian thymus. The fact that Galen should have selected this botanical name for the gland is indirect but positive evidence that he himself must have dissected out the ungulate thymus in the greatest possible detail—a tribute both to his scientific curiosity and to the thoroughness of his professorial practice.

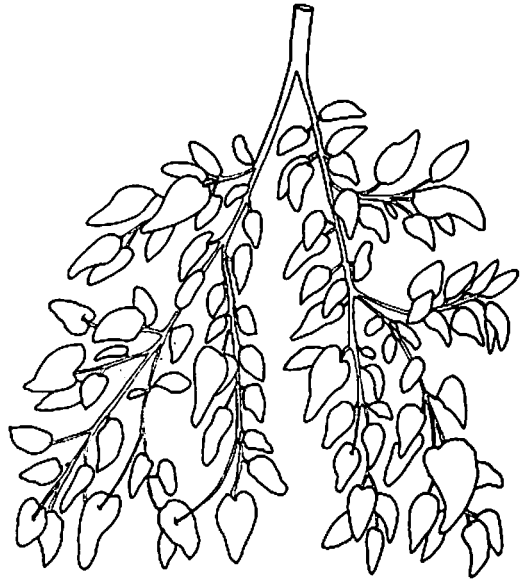


Fig. 1. Fully dissected thymus gland of young *Diceros bicornis*.