RICHARD OWEN AND THE DISCOVERY OF THE PARATHYROID GLANDS

by

A. J. E. CAVE

CREDIT for the discovery of the parathyroid glands is generally accorded to Ivar Victor Sandström (1852–89), who, in 1880, when praelector in anatomy in the University of Uppsala, published the first systematic account of these then 'new glands'.[1] Sandström noted the upper and lower parathyroid (parathyroids IV and III of modern designation) in man, and the bilaterally single parathyroid (parathyroid III) in the horse, rabbit and cat, all of which structures he considered to be embryonic portions of the thyroid gland. He gave these 'new glands' no distinctive name, and it would appear that the term 'parathyroid' was not employed in this connexion until its introduction in 1896 by Vassale and Generali.[2]

In 1881 Cresswell Baber[3] published his independent studies of what he thought to be 'undeveloped portions' of the thyroid gland (strictly, however, intrathyroid parathyroids) as observed in man and in several mammalian and avian species—findings subsequently confirmed in 1885 by Victor Horsley.[4]

In 1891 Eugène Gley[5] rediscovered the parathyroid gland (parathyroid III) in the rabbit, and thereafter until 1897 devoted much time and skill to the elucidation of parathyroid physiology, but regarded the parathyroids as so much potential thyroid tissue. In 1892 Cristiani[6] described the intrathyroid parathyroid gland of the rat. In 1893 Chantemesse and Marie[7] confirmed Sandström's original findings for the human subject, noting the superior gland (parathyroid IV) to be usually single and the inferior (parathyroid III) to be commonly multiple. In 1895 Kohn[8] first proclaimed the anatomical and physiological distinctness of the parathyroid gland from the thyroid gland, being seconded in this by Welsh[9] in 1898. Nevertheless, the separate identity and nature of these two anatomically contiguous glands received no immediate general acceptance, and as late as 1907 Forsyth[10] regarded the parathyroids as potential sources of thyroid tissue.

The relatively small size of the parathyroid gland in any given species, its epi- or intrathyroid situation in many, and the consequent difficulties attendant upon its experimental study, may well account both for the tardy recognition of its morphological independence and for the dubiety so long surrounding its physiological properties. The greater credit, therefore,

[1] I. V. Sandström, *Upsala Läkaref. Förhandl.*, 1880, xv, 441-71.
[2] G. Vassale and F. Generali, *Riv. di Patol. Nerv. e Ment.*, Firenze, 1896, i, 95–9.
[3] E. C. Baber, *Phil. Trans. Roy. Soc.*, London, 1881, clxxii, 600.
[4] V. Horsley, *Brit. Med. Journ.*, 1885, i, 111.
[5] E. Gley, *Compt. rend. Soc. de Biol.*, Paris, 1891, xliii, 841, 843.
[6] H. Cristiani, *ibid.*, 1892, xliv, 798.
[7] A. Chantemesse and R. Marie, *Bull. et mém. Soc. méd. d'hôp. de Paris*, 1893, 3s., x, 202.
[8] A. Kohn, *Arch. f. mikr. Anat.*, Bonn, 1895, xlix, 366.
[9] D. A. Welsh, *Journ. Anat. and Physiol.*, London, 1898, xxxii, 292, 380.
[10] D. Forsyth, *Quart. Journ. Med.*, Oxford, 1907–8, i, 288.

to the true discoverer of the mammalian parathyroid—Richard Owen,[11] who first observed and described (but did not name) this organ as early as 1852—the year of Sandström's birth.

Rolleston has summarized, with characteristic erudition, the history of the discovery of the several endocrine organs and has duly noted that, before the appearance of Sandström's classic publication, 'The presence of what were, or may have been, parathyroids was observed by Robert Remak (1815–1865) of Berlin in 1855, by Richard Owen (1804–1892) . . . in 1862 in an Indian rhinoceros . . . and by [R.] Virchow (1821–1902) in 1863 in man'.[12]

As will be shown, the true date of Owen's publication was 1852, not 1862, so that Owen antedates both Remak and Virchow, and, of writers before Sandström, has clear and undoubted priority in the matter of discovery. The object of this essay is to call attention to Owen's claim to recognition as the discoverer of the mammalian parathyroid, and to substantiate this claim by recounting the more detailed history of his find.

It was on 24 May 1834 that the Zoological Society of London acquired its first specimen of the Great Indian Rhinoceros (*Rhinoceros unicornis*). This animal, a male, reached the Society's menagerie on 20 September 1834, wherein it lived until its death, at about twenty years of age, on 19 November 1849, when it was anatomized by Richard Owen, at that time Hunterian Professor and Conservator of the Museum in the Royal College of Surgeons of England. The anatomy of this rare species being then but very imperfectly known, Owen welcomed the opportunity thus provided, as is evident from the following passage in a letter to one of his sisters:

> Amongst other matters time-devouring, and putting out of memory mundane relatives, sisters included, has been the decease of my ponderous and respectable old friend and client the rhinoceros. I call him 'client' because fifteen years ago I patronised him, and took it upon my skill, in discerning through a pretty thick hide the internal constitution, to aver that the beast would live to be a credit to the Zoological Gardens, and that he was worth the 1000 guineas demanded for him. The Council had faith, and bought him, and he has eaten their hay, oats, rice, carrots and bread in Brobdignagian quantities daily ever since, and might have gone on digesting, had he not, by some clumsy fall or otherwise inexplicable process, cracked a rib; said fracture injuring the adjacent lung and causing his demise. His anatomy will furnish forth an immortal 'Monograph', and so comfort comes to me in a shape in which it cannot be had by any of my brother Fellows.[13]

Owen's jesting prophecy was amply fulfilled, for the memoir 'On the anatomy of the Indian Rhinoceros (*Rh. unicornis*)' resulting from his investigation remains the classic paper on the subject.[14] The protracted and laborious dissection was carried out at the Royal College of Surgeons (where the Conservator then had resident quarters), Owen's wife recording in her diary that 'as a natural consequence' of this animal's death 'there is a quantity

[11] Sir Richard Owen, K.C.B., F.R.S. Born Lancaster, 20 July 1804. Hunterian Professor of Comparative Anatomy, 1837–55. Assistant Conservator, 1827–42, and Conservator, 1842–56, of the Museum of the Royal College of Surgeons of England; Superintendent, Natural History Department, British Museum, 1856–84. Died at Sheen Lodge, Richmond Park, Surrey, 18 December 1892.

[12] H. D. Rolleston, *The endocrine organs in health and disease.* London, 1936.

[13] Rev. R. Owen, *The life of Richard Owen.* London, 1894, vol. 1, p. 347.

[14] R. Owen, *Trans. Zool. Soc. Lond.*, 1862, iv, 31–58 (art. III, published 2 March 1852).

PLATE XXXI

FIG. 1. Sir RICHARD OWEN (1804–1892)

Pastel by E. W. J. Hopley, executed about the time of the parathyroid discovery, when Owen was Conservator of the Hunterian Museum

(Royal College of Surgeons of England)

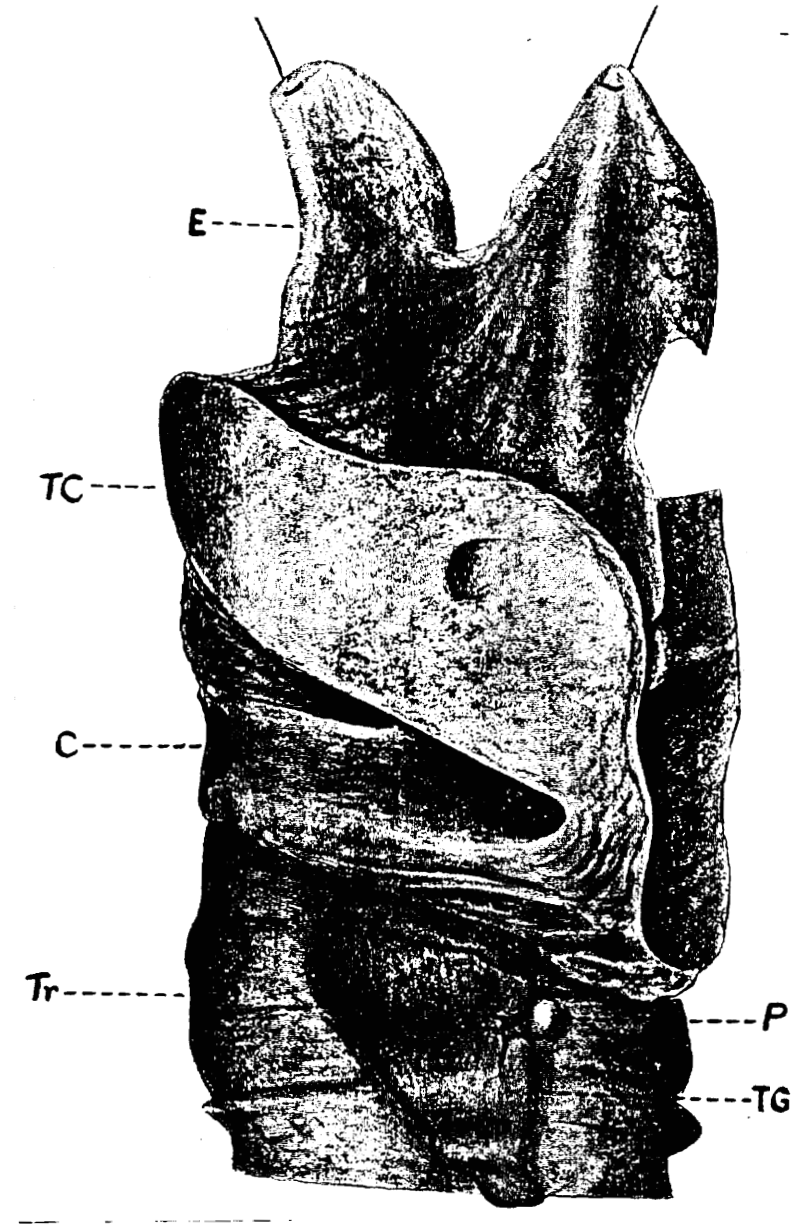

FIG. 2. Owen's original parathyroid specimen of the Great Indian Rhinoceros

C—cricoid cartilage, E—epiglottis, P—parathyroid gland, TC—thyroid cartilage, TG—thyroid gland, Tr—trachea

This specimen is the earliest known preparation of the mammalian parathyroid

(Royal College of Surgeons of England, Mus., Physiol. Series, L 331.1)

of rhinoceros (defunct) on the premises'.[15] The work of dissection and drawing proceeded apace during the winter months of 1849–50,[16] and on 12 February 1850 Owen communicated the resultant monograph to a meeting of the Zoological Society. This paper was published as the third article in the fourth volume of the Society's *Transactions*, which volume, covering the period January 1851 to September 1862, bears the terminal date of 1862—a point which has led Rolleston[17] and possibly others astray. For in those early days of the Zoological Society's publications, the individual papers comprising any particular volume of its *Transactions* appeared separately, under dates anterior to the terminal volume date.[18] Thus Owen's rhinocerotine memoir was published, not in 1862 as commonly supposed, but full ten years earlier, viz., on 2 March 1852, a point of importance in connexion with priority in the matter of the discovery of the parathyroid glands.

For this memoir contained, *inter alia*, two particularly eloquent tributes to Owen's acuteness and accuracy of observation and to his skill as an anatomist, viz. his discovery of the unsuspected pedal glands of this species, and his discovery[19] of 'a small compact yellow glandular body, attached to the thyroid at the point where the veins emerge', in other words, the parathyroid gland, of which this mention is the first in the history of anatomical science.

It is evident that Owen was much impressed by his remarkable find of this new 'body'. Though he neither named it nor suspected its true nature, he nevertheless clearly recognized its anatomical novelty and distinctness: he made full reference to its peculiar structure and topography in his later (1868) monograph on comparative vertebrate morphology,[20] and meantime carefully dissected out and preserved the 'body' in situ as a spirit specimen[21] in the Museum of the Royal College of Surgeons. The specimen, illustrated in Fig. 2, is still extant, an object of considerable historical interest. It shows the dissected parathyroid gland (now faded as to colour) situated upon, and partly within, the dorsal aspect of the lateral thyroid lobe somewhat close to its rounded cranial extremity. In the fresh state, obviously, the gland must have been very much less conspicuous, being masked by the dense and abundant perithyroid fascia and by the numerous thyroid veins, and hence likely to escape all but the most intelligent observation.

That, despite Rolleston's dubiety, 'Owen's small compact yellow glandular body' was indeed the parathyroid gland is confirmed by its comparison with

[15] Caroline Amelia Clift. Only daughter and surviving child of William Clift (1775–1849), John Hunter's famulus and first Conservator of the Hunterian Museum. She married Owen on his thirty-first birthday, 20 July 1835, and died, aged seventy, on 7 May 1873. She inherited her father's assiduity as a diarist.

[16] Certain of the organs were preserved in the Museum of the Royal College of Surgeons, and the skeleton was later presented by the Zoological Society to the British Museum (Natural History), where it is preserved, articulated, in the Osteology Room (B.M. 722g (51.11.10.2)).

[17] H. D. Rolleston, *op. cit.* (12), p. 275.

[18] F. Martin Duncan, *Proc. Zool. Soc. Lond.*, Sec. A.I, 1937, 71. H. Peavot, *ibid.*, Sec. A.I, 1893, 1913 (reprinted 1937), 83.

[19] R. Owen, *op cit.* (14), p. 48.

[20] R. Owen, *The comparative anatomy and physiology of vertebrates*. London, 1868, Mammals, p. 565.

[21] Roy. Coll. Surgs. Mus., Physiol. Ser., L 333.1 (Old Cat. No. 772 P).

the following additional rhinocerotine preparations (all from Zoo animals) in the Museum of the Royal College of Surgeons:

(A) R.C.S. Museum, Physiol. Series, L 332.1. Thyroid gland, etc., from a male Indian Rhinoceros (Zool. Soc., 1905). A large parathyroid body is attached to the superficial aspect of the cranial extremity of the thyroid lateral lobe. Its histological structure was shown by Burne[22] to be characterized by small clusters of cells surrounding a narrow lumen and to belong to Welsh's type 4 parathyroid: in some parts of the organ, however, a central lumen is wanting from the clusters, and the general structure conforms more closely to Welsh's type 3.[23]

(B) R.C.S. Museum, Physiol. Series, L 331.1. The larynx, thyroid, etc., from a male Indian Rhinoceros (Zool. Soc., 1932). The thyroid gland comprises a pair of longitudinally elongate lobes disposed diagonally upon the sides of the trachea, immediately below the larynx, and united ventrally by an isthmus of glandular tissue. Touching, and partly covered by, the dorsal margin of the thyroid lateral lobe, and in close proximity to the thyroid vessels, lies bilaterally an oval parathyroid body. More caudally, on the right side, lies a body of similar appearance. The two craniad bodies are undoubtedly parathyroids, and consist of masses of cells separated into lobules by a framework of connective tissue. The more caudally placed dextral body contains much adenoid tissue, scattered amongst which are cellular masses whose nature, from faulty preservation, cannot be accurately determined.

The identification of Owen's 'compact yellow glandular body' with the parathyroid gland is also confirmed by the writer's dissection of the thyroid region of two adult male Indian Rhinoceroses which died in the menagerie of the Zoological Society of London in 1941 and 1945 (see Fig. 3, A, B, C).

The first of these was a twenty-year-old animal. The thyroid gland consisted of two pyriform lateral lobes united mid-ventrally by a narrow, ribbon-like isthmus. A single parathyroid gland was present on each side. That on the right lay towards the caudal pole of the lateral thyroid lobe, adherent to the dorsal aspect thereof by connective tissue, and completely hidden from view by a dense plexus of thyroid veins and by the abundant supporting pretracheal fascia, here forming the sheath of the thyroid gland. Its dissection emphasized the difficulty of displaying satisfactorily a structure known to be present within a very limited region: it was finally disclosed only by a bold section made in the neighbourhood of its suspected presence, when its spongy, gamboge-yellow parenchyma proclaimed its true position and nature (Fig. 3, A).

The left parathyroid gland was more easily displayed after careful dissection of the numerous emergent thyroid veins. It was epithyroid in position, its capsule being attached by dense connective tissue to the thyroid sheath, within which it was partly embedded: it was distinguishable from local lymph glands by its spherical shape, its distinct capsule, its vascular

[22] R. H. Burne, *Proc. Zool. Soc. Lond.*, 1905, i, 56–8.

[23] D. A. Welsh, *op. cit.* (9), p. 292.

and fascial connexions and (on section) by its golden colour and spongy consistency (Fig. 3, B).

The second animal examined was some fifteen years of age. The thyroid gland comprised two rather elongate lateral lobes, united by the usual flat, narrow isthmus. A single parathyroid gland was present on each side, embedded in the thyroid gland about half-way along the dorsal aspect of the lateral lobe, and not at all apparent even after carefully dissecting away the thyroid blood-vessels and the thyroid fibrous sheath. Section of the thyroid at the anticipated site of the parathyroid was necessary to establish beyond doubt the presence of the smaller gland (see Fig. 3, C).

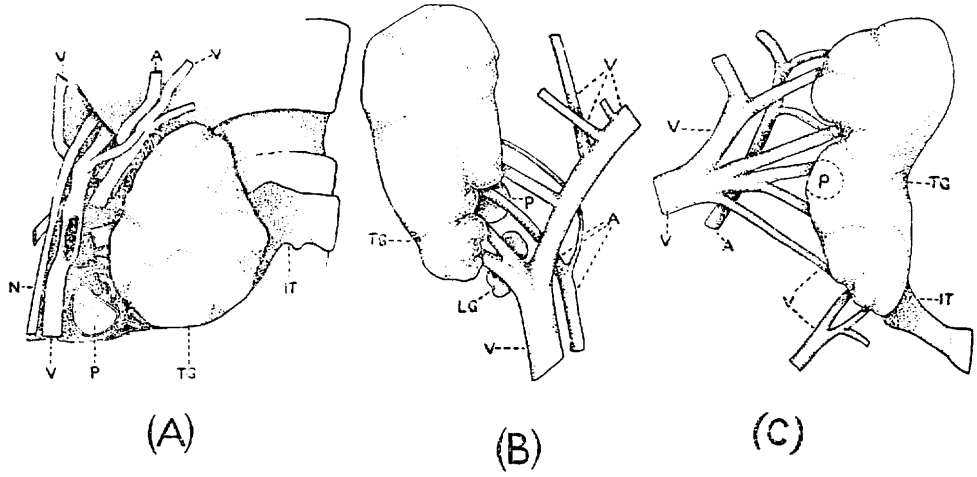

Fig. 3. The thyroid region of the Indian Rhinoceros.

(A) The right parathyroid gland of an adult male Indian Rhinoceros, dissected in situ by the author (1941). The gland appears in section.

(B) The left parathyroid gland from the same animal, fully exposed by removal of the perithyroid fibrous tissue.

(C) The right parathyroid gland, from a second adult male Indian Rhinoceros, dissected in situ by the author (1945). The gland is intrathyroid.

A—artery, V—vein, N—recurrent nerve, TG—thyroid gland, P—parathyroid gland, LG—lymph gland, IT—thyroid isthmus.

The quest for the parathyroid gland in these two animals, a sufficiently tedious and laborious business, engendered an enhanced respect for Owen's prosectorial thoroughness and accuracy of observation. Owen had no foreknowledge of the presence of this small organ—in diameter and circumference no greater than a sixpenny piece—and, in the necessarily rapid gross dissection of so unwieldy a subject as a Rhinoceros, had every excuse for overlooking the new body altogether. Indeed, had the parathyroids in his animal been wholly intrathyroid in position, it is probable that they would have escaped discovery. It is also probable that it was the distinctive yellow colour of these glands that first arrested Owen's attention. In his original preparation, the left moiety only of the larynx and thyroid gland is preserved, together with the left parathyroid gland (see Fig. 2). Owen must have sectioned the right parathyroid, so as to note its distinctive yellow colour and glandular nature, but this, whether by accident during dissection, or deliberately, after observing the new 'body', cannot now be known.

That Owen was the first to describe and to preserve the gland now called parathyroid, and that he recognized its glandular nature, is sufficiently established. His discovery deserves to be more widely known and appreciated, not only as constituting a tribute to his acumen as an investigator, but also as redounding to the credit of British anatomical science.

The term 'parathyroid' is admittedly unsatisfactory as a descriptive label for structures which, in different mammalian species, and even in different individuals of any one species, may be indiscriminately para-, epi- or intrathyroid in position. For want of a more convenient term, and by general acceptance, this name is established and is likely to remain. At one period, however, the parathyroids were commonly known as 'Gley's glands'. Eponymous anatomical nomenclature is, unfortunately, unfashionable nowadays—to the detriment of the student's appreciation of the long, varied and educative history of the subject. But should such nomenclature achieve a return to favour, the parathyroids are already provided with their most appropriate name—'the glands of Owen'.

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