

AN AMERICAN 'DEXTER MONSTER'

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FOUR FIGURES

British scientific literature contains numerous reports of, and references to, an advanced type of developmental abnormality commonly spoken of as the 'Dexter monster.' It occurs as an abortus at any time during the gestation period in closely inbred herds of the Dexter breed of cattle, and occasionally, according to report, in the Kerry, a closely related breed. The Animal Breeding Research Department of the University of Edinburgh, in particular, has studied the condition very carefully and accumulated a considerable body of accurate and worth-while information relating to it. But few similar instances of the kind have been reported from either the continent of Europe or from America, and, unfortunately, when such material reaches us in this country it is apt to be in such an advanced postmortem condition as to make careful cytological study difficult or impossible. This was in part true of the present subject, but, in spite of the fact, enough definite information was obtained to make it seem worthy of report.

In May, 1927, a farmer from the locality brought to Professor Scott, of the Department of Zoölogy, Indiana University, an animal which he claimed to be half calf, half bulldog. It was explained to him that such a condition was impossible, whereupon he insisted that at any rate the animal had been 'marked' by its mother being chased by a bulldog. The appearance of the animal was such as to make such a belief not so unreasonable in the man's mind. Further questioning

elicited the following information, which appears to be reasonably correct. The mother of the abortus was a Holstein-Jersey cross, the father a Holstein. It had been stillborn at or very near to term. Three or four years earlier, the same cow had given birth to a similar monster, but whether or not by the same bull could not be determined. Between the births of the two monster calves, she had borne two normal ones. Further information was not obtained.

About forty-eight hours after the birth of the animal, an attempt was made to inject it for dissection. This injection was only partly successful and when the animal was dissected a number of important parts were so far degenerated as to make it impossible to do a careful study of all of the tissues and organs.

While most, or all, of the cases from the British Isles are from the closely inbred Dexter or similar breeds, this subject was from an entirely different breed and was assuredly not the product of inbreeding. So marked has been the tendency toward the production of the monster in the Dexter breed that Crew reports that in some herds the number of this type of births approached 20 per cent of the total. On the other hand, it is apparent that they constitute something of a rarity in this country and are not the result of a distinctive type of breeding.

Examination of the subject revealed some interesting findings, agreeing in large part, but not entirely, with those of Seligmann, Jansen, Crew, and others. The 'long bones' were very short and thick, with the cartilage showing only occasional areas of calcification. This made the extremities extremely 'stubby,' yet weak in character. The animal was markedly pot-bellied, with the tail high up on the body. The head was short anteroposteriorly and wide laterally, and there was a great underdevelopment in the superior maxillary region, giving the animal the 'bulldog' appearance already described (fig. 1). The teeth were rather precociously developed and large, but somewhat irregular in alignment. The tongue was extremely large and protruded from the

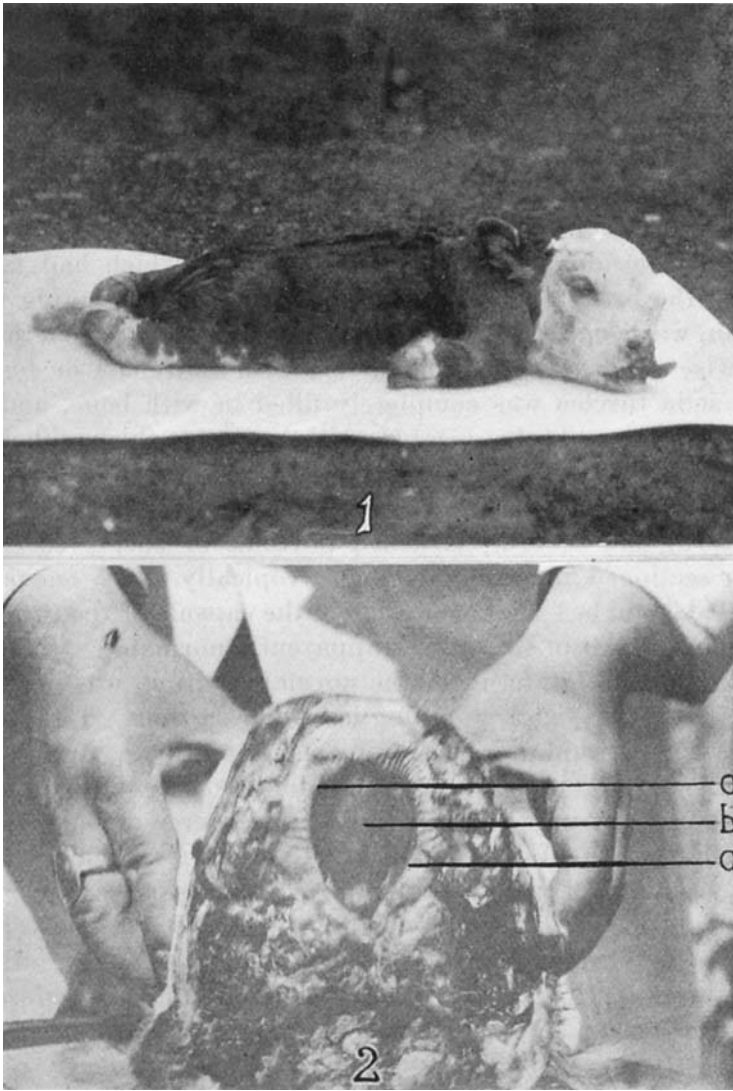


Fig. 1 The monster in the condition in which it was received, showing the cretinoid or 'bull-dog' appearance.

Fig. 2 Photograph of palatal region with mandible removed. *a*, maxillary ridges; *b*, opening into nasal cavity, showing complete absence of hard palate.

mouth. No hard palate was present (fig. 2). The general appearance bore a noticeable resemblance to the human cretin.

Dissection revealed a remarkably thick skull—more than $\frac{1}{2}$ inch thick at its thinnest part, dense in character, with completely obliterated sutures, no diploë, and a microcephalic brain. The skin was exceptionally thick and tough, while under it was a thick layer of loose, watery, areolar tissue. Due to the advanced postmortem changes which had taken place, the brain around the pineal gland, and including that organ, was completely obliterated. Postmortem degeneration likewise made it impossible to study the adrenals or testes. The sella turcica was completely filled in with bone, and no hypophysis could be located, although the thick sphenoid bone was broken up and examined, the pharyngeal region was studied, and the dura over the entire base of the brain dissected and several thickened portions of suspected character sectioned and examined microscopically. Only one parathyroid could be found, which lay in the capsule of the thyroid. Although small in size, it was apparently normal in structure.

The thyroid lay in about the normal position, was a single mass, but very small, weighing less than 7 grams. Its alveoli were very irregular in both size and condition. Some were quite large and well filled with colloid, some contained only very small amounts of colloid, and some were completely collapsed (fig. 3). Large numbers of peculiar follicular cells, the cytoplasm of which stained pink with eosin, were present in widely different developmental stages. It was only possible to determine their epithelial character with the oil immersion in daylight, with which their character showed quite plainly (fig. 4). Apparent mitotic figures of varying stages could be seen, as well as some in what was evidently a degenerating condition with the nuclei breaking down. It is the opinion of Doctor Warthin that the former are undifferentiated acinus cells. Bensley, MacCallum, Cooper, Goetsch, Giordano, and Caylor have all described different peculiar types of cells as being present in the varying functional and

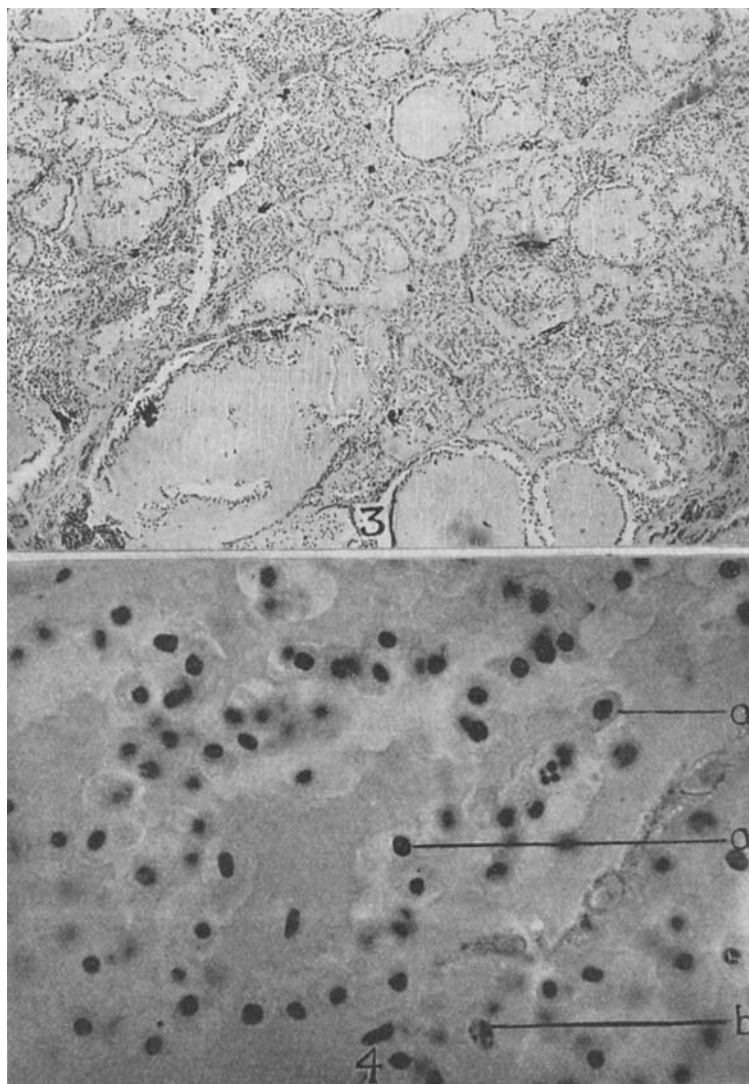


Fig. 3 Thyroid, low-power ($\times 60$), showing the alveoli in varying conditions.

Fig. 4 Thyroid, oil-immersion ($\times 1100$), showing various cell stages. *a*, eosin-staining follicular cells with solid-appearing nuclei; *b*, same cell with nuclei apparently undergoing mitosis.

pathological conditions of the thyroid. Taking into consideration the widely variant fixing and staining methods used and the different types of thyroid cells known to exist, it would seem to be highly possible that all of these were follicular cells in different states of developmental or functional activity. It would appear that these cells are markedly altered by any functional changes in the gland. This would account for the wide variety of peculiar cell types noted by different observers under differing conditions.

While the thyroid presented the most interesting picture obtained from this specimen, and was undoubtedly abnormal, it would seem that, although quite small, it presented evidence of distinct activity. This fact would appear to rule out the possibility of cretinism, as suggested by Seligmann, and denied by Crew.

The thymus was abnormally large, weighing over 130 grams, but microscopic examination revealed the picture of a normal, active thymus.

Seligmann ('04) was convinced that this condition in the Dexter was due to hypofunction of the thyroid and was cretinoid in nature, while Murk Jansen ('13) suggested that achondroplasia, of which this monster is undoubtedly a type, is caused by a heightened pressure of the amnion during the early period of gestation. Crew and Glass ('22) found that the thyroid was varyingly abnormal, but that the picture was not one of cretinism. Crew, in 1923, after additional studies, suggested the possibility of a pituitary etiology, and later in the same year published a rather comprehensive study in which he expressed the opinion of an hereditary cause as underlying a possible pituitary malfunction, and attempted to demonstrate its transmission in mendelian terms.

It is apparent from the widely varying conditions of the different endocrine glands in the otherwise similar cases reported, that it would be well-nigh impossible to attribute the condition to any one gland. The relationship between the conditions and the endocrines must, I think, be considered as being between the condition and the endocrine system as a whole, rather than a single gland of the system.

In this subject, the history of an earlier similar monster, the offspring of the same mother, lends strength to the theory of an hereditary etiology, so clearly demonstrated in the case of the Dexters. The markedly abnormal condition of the thyroid would point to that gland's having a part in it, although the condition is not, apparently, one of cretinism. Both thymus and parathyroids can probably be considered because of the large size of the one and the small size of the other, but the normal condition of the cells of each would probably eliminate both. The fact that the hypophysis was either absent or decidedly anomalous as to both form and location would strengthen Crew's claim for the etiological importance of that gland in the condition. Yet Nickerson ('17), in his case, which showed total absence of thyroid, large thymus, and a pituitary gland at least present, does not seem to view it from that angle.

Davenport ('23) has intimated the possibility of the endocrine system functioning as a very important mechanism, in influencing the transmission of many hereditary characters. This view seems to be well borne out by the studies of the Dexter. The basic cause would be extremely difficult to determine. Heredity and the endocrine system here, as in many other cases, seem to be inextricably bound up. In these cases, both undoubtedly play a very important part. It is not unlikely that in many obscure conditions the endocrine system is altered, this variation being passed on by the genetic mechanism, to be again possibly further altered by the endocrines, and again transmitted to the new sex cells.

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