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The forgotten origin of *Acanthobothrium* Blanchard, 1848 (Tetraphyllidea: Onchobothriidae)

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The genus *Acanthobothrium* assembles a set of cosmopolitan onchobothriid tapeworms parasites of elasmobranchs. Despite its clear diagnostic features, which include a scolex with four bothridia each bearing three loculi and a pair of bipronged hooks, this genus is represented by species that possess a diversity of morphologies and host lineages (e.g. rays, skates, guitarfishes, and sharks; Campbell & Beveridge 2002; Zschoche *et al*. 2011). The wide distribution of this genus, its diverse morphology, and, perhaps most importantly, its lengthy and complex taxonomic history likely account for the fact that, to date, the absolute number of valid species, of potentially more than 200 nominal species, cannot be assigned to the genus with certainty. Clearly, a taxonomic revision of this group is overdue; a task that certainly will only be accomplished by collaborative efforts of cestodologists around the globe, given the widespread distribution of its species and the necessity of collecting new material to verify host identities and morphology in many cases. It is not our purpose here to provide such a revision. However, in order to get the basis for such a task, it is our intention to clarify the authorship, date of publication, type species, and type host of *Acanthobothrium*. To the best of our understanding, these have been mistakenly assigned throughout the taxonomic history of the genus.

Despite early taxonomic reviews (e.g. Williams 1969), there is still no consensus on the authority of *Acanthobothrium*. The first volume of the Nomenclatur Zoologicus (Neave 1939: 11) registers two entries for the genus-group name: "Blanchard 1849 (Feb.)" and "*Acanthobothrium* van Beneden 1849 [apparently between Jan. & March]" (sic). This suggests that at least since 1939 the authorship of the genus is ambiguous. Contemporary authors disregard Blanchard as the author of *Acanthobothrium* and assign two possible dates for Van Beneden's authorship of the genus. Some (e.g. Euzet 1994; Vardo-Zalik & Campbell 2011) assign *Acanthobothrium* to Van Beneden (1849); others (e.g. Twohig *et al*. 2008; Zschoche *et al*. 2011) implicitly assume that the genus should be recognized as valid by the more detailed description provided by Van Beneden (1850).

However, to our knowledge, the first use of the name *Acanthobothrium* was actually by Blanchard (1848: 364) in the legend of Plate 12, Fig. 9, which reads "ACANTHOBOTHRIE COURONNÉ (*Acanthobothrium coronatum*), pour montrer la forme de la tête, la forme générale du corps, et le trajet dos tubes intestinaux." We argue here that the name *A. coronatum* was thereby made available by Blanchard at that time since this nomenclatural act satisfies the provisions of Articles 11 and 12 of the ICZN (1999) for a species-group name published before 1931; in this case the "indication" associated with the name satisfies Art. 12.2.7 as it is an illustration. Thus, despite the absence of a detailed description for the new species, Blanchard (1848) should be credited with the authorship of *A. coronatum* for his is the first published work to use the name (ICZN Art. 23.1). With respect to the genus, it is important to note that the availability of a new species-group name is not dependent on the availability of the genus-group name (ICZN Art. 11.9.3.1). However, if the species-group name is available, so is the genus-group name with which it is associated (see ICZN Art. 12 and 12.2.5). Thus, Blanchard (1848) should also be credited with the authorship of the genus-group name, *Acanthobothrium*.

In February of the next year, Blanchard (1849: 121–122) provided the first detailed description of the "Genre Acanthobothrie (*Acanthobothrium*)" in which he indicated "*Bothriocephali onchobothrii* Rud." as its type species. In the same month (date confirmed by Muquardt 1849, Ref. No. 118), Van Beneden (1849: 191) indicated a different type species for the genus using the term "*Acanthobothrium n. gen. Bothr. bifurcatus*" in a list of genera he considered to belong in "Bothroïdes." In the second revision of *Acanthobothrium*, which was accompanied by a detailed description of *A. coronatum*, Van Beneden (1850: 129) cited "*A. coronatum* Rud." as the type of *Acanthobothrium*. With such confusion associated with the first works dealing with *Acanthobothrium*, it is not surprising that the type species of the genus remains unclear. For example, while Yamaguti (1959: 83) claimed that the type species of *Acanthobothrium* was

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"*A. coronatum* (Rud., 1819) van Beneden, 1849 (Pl. 21, Fig. 163), syn. *Bothriocephalus bifurcatus* Leuckart, 1819", Campbell & Beveridge (2002: 239) state that the type species is "*Bothriocephalus coronatus* Rudolphi, 1819 by original designation." However, none of the aforementioned works published after Blanchard (1848) are valid nomenclatural acts regarding the typification of *Acanthobothrium*. Since there were no other species attributed to *Acanthobothrium* in 1848, *A*canthobothrium *coronatum* should be considered the type species of this genus by monotypy (ICZN Art. 68.3).

Also worth consideration here is the valid name of the taxon referred to as *A. coronatum*. Stability of the name-bearing type requires that the name-bearing type of a nominal genus remains unchanged (i.e., as its original combination; see ICZN Art. 67.1.2 and Recommendation 67B). As originally designated by Blanchard (1848), *Acanthobothrium coronatum* in the type species of *Acanthobothrium*. Nevertheless, understanding the convoluted taxonomic history of *A. coronatum* is crucial for understanding the concept of *Acanthobothrium* and of this species itself.

The first detailed description of of *A. coronatum* was provided by Blanchard (1849: 122–124), with a list of three synonyms including "*Taenia raiae batis*" Rudolphi (1810), *Bothriocephalus coronatus* Rudolphi, 1819, and *Bothriocephalus bifurcatus* Leuckart, 1819. *Bothriocephalus bifurcatus* was described by Leuckart (1819: 30–32) who considered *Taenia corollata* Abildgaard, 1790 as its senior synonym. Abildgaard (1790: 62–63) provided a description of *T. corollata* consistent with a member of *Acanthobothrium* and identified "Rajæ Batis" (*Raja batis* L.) as the type host of his new species (see Abildgaard 1790: 63; "LOCUS. Inter valvulas cochlidiales intestini Rajæ Batis"). The name *B. corollatus* was previously used by Rudolphi (1819: 485–486). This may have led Leuckart to assign his species in a different species group name. *Bothriocephalus bifurcatus* was selected for the new species-group name giving into consideration its bipronged hooks. The establishment of *B. bifurcatus* as a junior synonym of *A. coronatum* results in a new combination, *Acanthobothrium corollatum* (Abildgaard, 1790), following the oldest available name for this taxon, *T. corollata* (ICZN Art. 23.3).

Williams (1969: 5) had previously suggested that "in view of the numerous problems connected with the specific name '*corollatus*' relative to Tetrarhynchide (...) it may be advisable to ignore the name *T. corollata* Abildgaard, 1793 in studies of *A. coronatum*" (sic). Note that Willians (1969: 5) is probably referring to Abildgaard (1790) when he writes "Abildgaard, 1793". Moreover, Williams (1969: 5) advocated that "the host list given by Abildgaard (...) indicates that he may have been dealing with more than one species under the same name." Whether or not Abildgaard (1790) was dealing with a complex of several species has no nomenclatural relevance, since it neither interferes with the availability of the name *T. corollata* nor stands as an impediment for the appointment of this name as a senior synonym of *A. coronatum*.

Once the type species of *Acanthobothrium* and its current valid name is clarified, the identity of the type host may now be addressed. According to Williams (1969: 9), "*A. coronatum* should be regarded as a cestode of *Scyliorhynus stellaris* only." Williams' (1969) statement ignores that the concept of *B. bifurcatus* is correlated with Leuckart's (1819: 31–32) concept of *T. corollata*, which according to Abildgaard (1790: 63), had only been found in *R. batis*. The corollary of this historical event is that the type species of *Acanthobothrium* is associated with *R. batis*.

In an effort to more completely understand the concept of *A. corollatum*, we attempted to locate the type materials used in the original descriptions of its older synonyms. Unfortunately, all of Abildgaard's material was lost throughout the years (Buchmann, per. comm.) and our efforts to locate Leuckart's original material have also been fruitless. At this point, it seems that the type series of *A. corollatum* (including older synonyms) could have been lost. In this case, assigning a neotype for *A. corollatum* would not be recommended since the type material would have to be consistent with the original concept of its synonyms (ICZN Art. 74–75), which are related to parasites of *R. batis*. The original description of *T. corollata* may not suffice the requirements to identify which one is Abildgaard's concept of *T. corollata* since, according to Campbell & Beveridge (2002), there are at least five nominal species of *Acanthobothrium* known to occur in *R. batis*: *Acanthobothrium icelandicum* Manger, 1972; *Acanthobothrium parvum* Manger, 1972; *Acanthobothrium rajaebatis* (Rudolphi, 1810); *Acanthobothrium septentrionale* Baer & Euzet, 1962; and "*Acanthobothrium coronatum* (Rudolphi, 1810) van Beneden, 1849."

We conclude that the authorship of *Acanthothrium* belongs to Blanchard (1848). The type species of *Acanthobothrium* is *Acanthobothrium coronatum* Blanchard, 1848, a junior synonym of *Acanthobothrium corollatum* (Abildgaard, 1790) comb. n. The type host of *A. corollatum* and therefore *Acanthobothrium* is *Raja batis* L.

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