

Olecranon Lesions Caused by *Onchocerca skrjabini* in Wild Japanese Serows (*Capricornis crispus*)

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ABSTRACT. Wild Japanese serows (*Capricornis crispus*) were found to have parasitic lesions in tendons that attached the musculus triceps brachii to the olecranon. Histopathological study of the lesions showed chronic tendinitis with multiple granulation nodules around the worms. The lesions were found in 138 of the 353 serows examined and were more frequent in aged animals than young ones. Transverse ridges on the cuticle of the female midbody, the sizes and morphological features of the spicules, and the arrangement of the caudal papillae of the males showed the parasite to be *Onchocerca skrjabini*. Therefore, *O. skrjabini* causes olecranon lesions in addition to fibrous bursa formation in carpal and tarsal regions of the Japanese serows. — **KEY WORDS:** Japanese serow, olecranon, onchocerciasis.

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Wild Japanese serows (*Capricornis crispus*) captured in Gifu Prefecture, Japan, have been found to have onchocerciasis with two kinds of pathological lesions visible in the subcutaneous tissue [5]. In one kind, yellowish-gray nodules are found sporadically in various parts of the body, and in the other, fibrous bursa formation is found mostly in the carpal and tarsal regions.

Different *Onchocerca* species were found in the lesions, and numbered 1 and 2, respectively. Later, species 1 was named *O. suzukii* Yagi, Bain and Shoho, 1994, and species 2 was found to be *O. skrjabini* Rukhlyadev, 1964 [8]. *O. tarsicola* (a synonym of *O. skrjabini*) has been found free in the feet of red deer, *Cervus elephas*, in Germany [2], but lesions were not found, nor had lesions caused by *O. skrjabini* been detected before in other host animals, to the best of our knowledge.

The purpose of this report is to describe the occurrence and pathological findings of olecranon lesions caused by *O. skrjabini*. Characteristic features of *O. skrjabini* before and after being sectioned also are reported.

Materials in the present study were from 353 individuals (57 fawns, 46 yearlings, and 250 adults) captured between December 1983 and March 1984 in Gifu Prefecture in accordance with the policy of the Agency of Cultural Affairs, Japan, for conservation and control of Japanese serows. Worms were extracted from olecranon lesions preserved in formalin solution and sectioned for histological inspection.

Upon necropsy, parasitologic lesions were found in tendons attaching the musculus triceps brachii to the olecranon (Fig. 1). Cut surfaces of affected tendons showed hard, yellowish-white lesions measuring at the widest 0.7–1.8 cm, without clear margins. In severe cases, many brownish patches were found scattered throughout the lesions. Histopathological study of the lesions showed chronic parasitic tendinitis with multiple granulation nodules around the worms (Fig. 2). Affected tendon tissues showed other changes as well, such as pyknosis of tendon cells, edematous dissociation of collagenous fiber bundles, hyalinization, and metaplastic alteration of chondroid tissue.

Near the adult worms, masses of microfilariae were often found.

In some cases, individual microfilariae penetrated collagenous fiber bundles. In severe infections, interstitial cell infiltration by eosinophils, lymphocytes, macrophages, and plasma cells was occasionally observed in neighboring muscle tissue. Olecranon lesions were found in 138 of the 353 serows examined and were found in a greater proportion of older animals.

Parasitologic examinations were done of the anterior portions of one female and three males and the posterior portions of one female and two males. Midbody portions of male and female worms also were examined.

The body width of the females was 153–398 μm . The muscular portion of the esophagus was 612 μm long, and the distances of the nerve ring and vulva from the anterior end were 224 and 408 μm . At the midbody, the intervals between transverse ridges were 153–189 μm , and the intervals between internal striae were 36–49 μm . The ridges were not branched over lateral chords (Fig. 3). Transverse sections of the female midbody showed three to five muscle cells (Fig. 4). Microfilariae (extracted from the uteri at the midbody region) were 192–270 μm long and 3–5 μm wide.

The body width of the male was 138 μm . The nerve ring was 208–214 μm from the anterior end. The esophagus measured 1989 μm long (muscular portion, 1,020 μm and glandular portion, 969 μm). The tail was 78 or 145 μm long. The length of the left spicule was 260 or 299 μm ; that of the right spicule was 91 or 104 μm , with cuticle that was broad, tubular, and heavily sclerotized proximally, narrowing distally to a knobbed end (Fig. 5). The caudal papillae were arranged with one precloacal papilla and two groups of caudal pairs. The group near the cloaca was composed of five papillae on the right and four or five papillae on the left and one pair subventrally; the other group, at the end of the tail, was composed of four pairs (the eighth on the right and the seventh on the left in Fig. 5 seemed to accompany with phasmidial pores). Caudal alae were present.

The transverse ridges on the external cuticular layer of

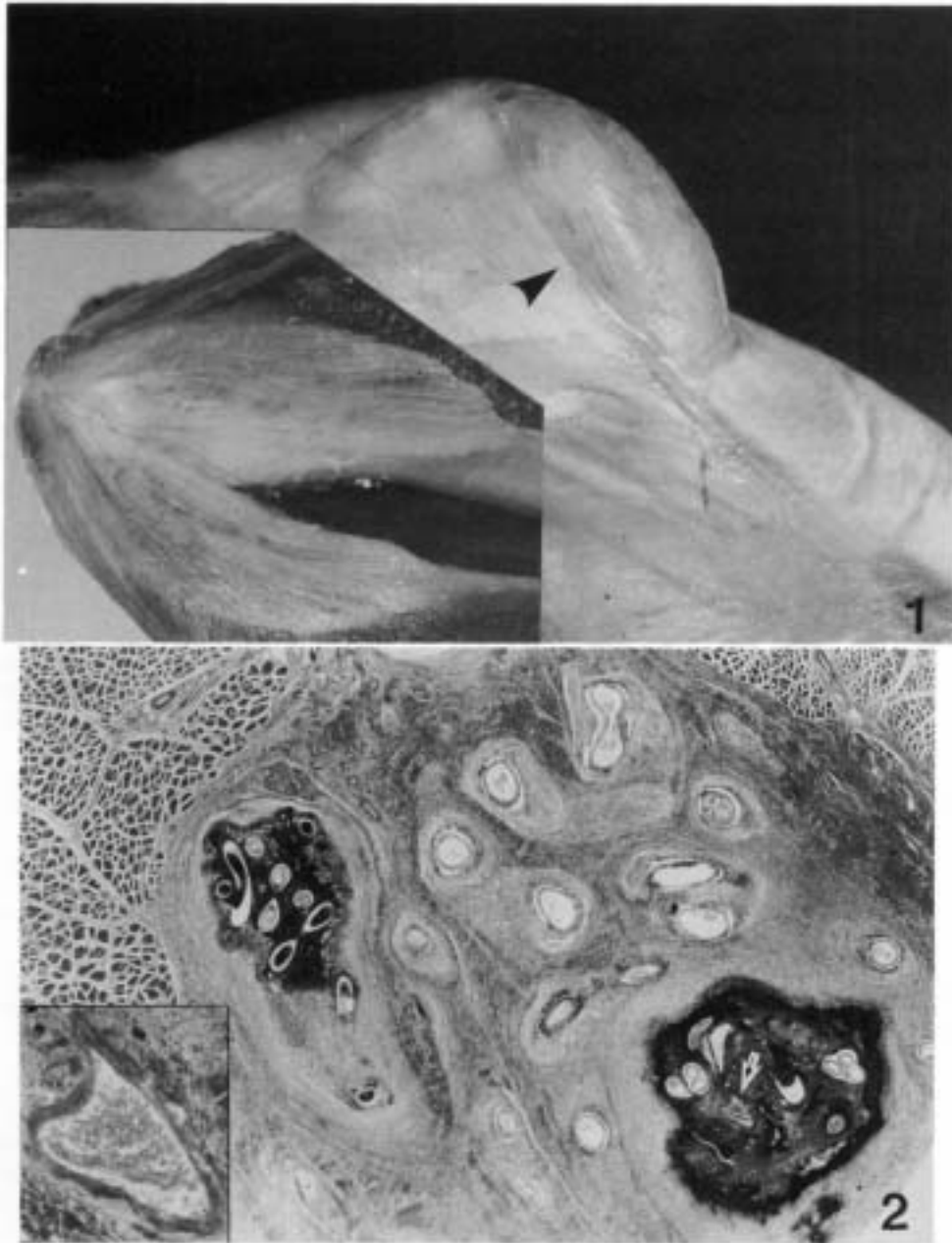


Fig. 1. Focal swelling of a tendon (arrowhead). Inset: Cut surface of the lesion.

Fig. 2. Multiple parasitic granulation nodules in a tendon. HE stain. $\times 18$. Inset: Higher magnification of area near arrow. Many microfilariae can be seen. $\times 90$.

the female midbody regions, the sizes and morphologic features of the spicules, and the arrangement of the caudal papillae of the male specimens showed the parasites to be *O. skrjabini* described by Bain and Schulz-Key [2] and Yagi *et al.* [8]. However, the vulva was more anterior than described before [8]. The microfilariae were small, suggesting their immaturity.

Thus, our findings indicate that *O. skrjabini* is the

causative agent of olecranon lesions and fibrous bursa formation in carpal and tarsal regions in wild serows. *O. suzukii*, in contrast, causes only subcutaneous nodules in various parts of the torso of serows [5, 8].

Recently, two cases of zoonotic onchocerciasis caused by *O. gutturosa* in humans were reported in Oita, Japan [3, 7]. Six *Onchocerca* species have been found in Japan: *O. lienalis*, *O. gutturosa*, and an *Onchocerca* sp. in cattle, *O.*

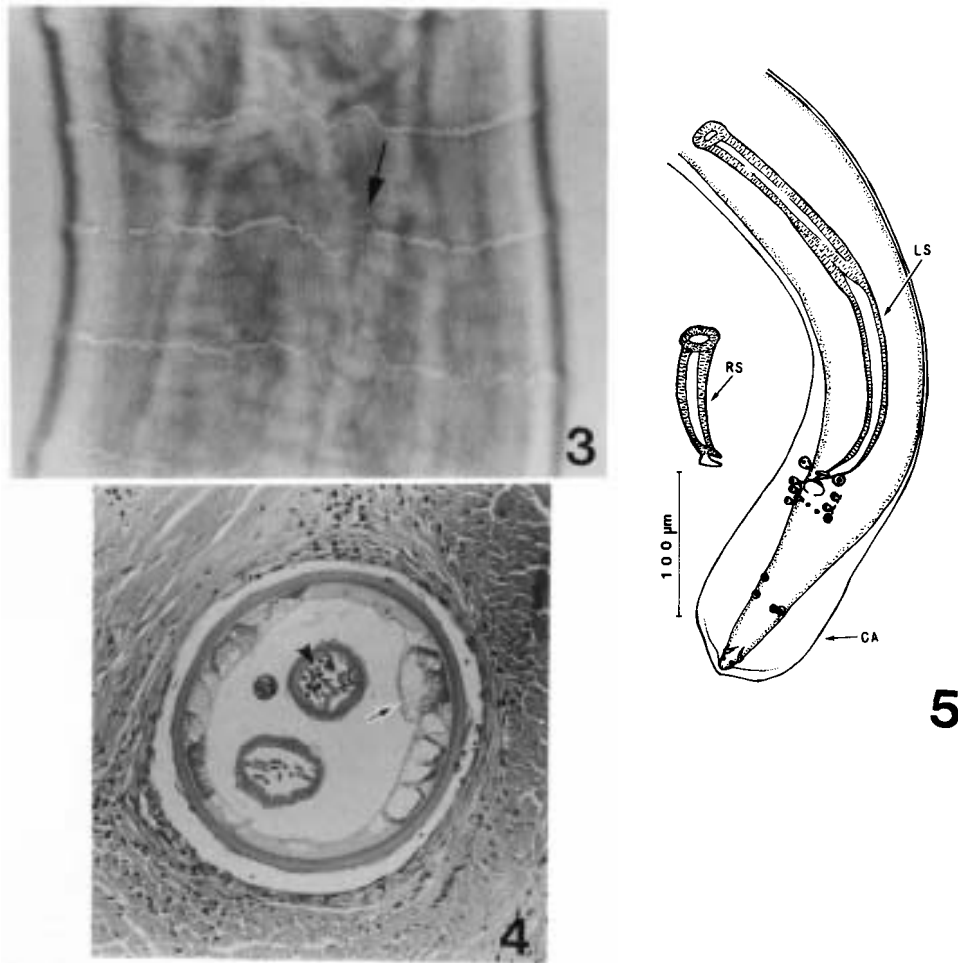


Fig. 3. Transverse ridges on the external cuticular layer of the midbody of a female *Onchocerca skrjabini*. The ridges are not branched over the lateral chord (arrow). $\times 150$.

Fig. 4. Cross-section of the midbody of a female. A few muscle cells are seen (arrow). Microfilariae are seen in the uteri (arrowhead). $\times 130$.

Fig. 5. Camera lucida drawings of the caudal region of a male. CA, caudal ala; LS, left spicule; RS, right spicule.

cervicalis in horses, and both *O. suzukii* and *O. skrjabini* in serows. Human infection caused by *O. skrjabini* has not been reported. *O. tarsicola* is transmitted by blackflies (*Simulium ornatum*) in European cervids. *O. gutturosa* also is transmitted by this blackfly as well as by biting midges (*Culicoides*) in cattle in Europe [1]. *Simulium bidentatum* transmits *O. gutturosa* in Oita, Japan, being not only boviphilic but also anthropophilic [6]. Vector species of *O. skrjabini* parasitizing Japanese serows have not been identified, but the possibility of human infection caused by *O. skrjabini* remains open.

Cross-sections of *O. skrjabini* closely resembled those of *O. gutturosa*; both species have conspicuous transverse ridges [7]. The ridges of *O. gutturosa* are branched over lateral chords [4]. The ridges of *O. skrjabini* in the midbody are not branched. In geographic locations where both species have been found, these features of the ridges may

be helpful in identification of the species in zoonotic cases in humans. Surveys of the geographic distribution of onchocerciasis in serows also may give information useful in distinguishing species.

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