SIMULIUM DAMNOSUM, NATURALLY INFECTED WITH *ONCHOCERCA VOLVULUS* IN SOUTH-WEST ETHIOPIA¹

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Abstract: The existence of onchocerciasis in Ethiopia, especially in its South-Western Region was known. The naturally infected *Simulium* has not been reported in the region, though there has been reported the existence of *S. damnosum*, *S. woodi* etc. which were identified as the vectors of this disease in other parts of Africa. The authors obtained a number of *Onchocerca volvulus* from *S. damnosum* collected by biting-catch method in the field in August and November, 1971. Dissection was made on the 975 *Simulium* out of about 1000 caught at the riverside of Gojeb and those caught at Didessa riverside. The infection rate ranged from 10.2 to 12.9% in the former and 20.0 to 40.6 in the latter. The sausage type was most frequently found and the late stage type was detected in 11% of *Simulium*. An evidence was given that *S. damnosum* is the main vector of onchocerciasis in Ethiopia, since this species formed an absolute majority of the flies collected by biting catch and no filaria was detected in the other species.

The existence of onchocerciasis in Ethiopia was initially ascertained in 1939 at Bonga, Kefa Province, and the collection record on *Simulium damnosum* was made by the same author (Giaquinto, M. 1939).

Oomen, A. P. (1969) collected *S. damnosum* and *S. woodi*, and suggested that *S. damnosum* might be the vector of this disease in the south-west Ethiopia surveyed.

Although *S. damnosum* has been incriminated to be one of the potential vectors of onchocerciasis in Ethiopia, naturally infected *S. damnosum* has not yet been reported, so far as we are aware.

In order to clarify the vector species of this disease, we visited the endemic area of South-west Ethiopia in 1971, and made attempts to check infected adult black flies.

This paper is a brief report on the discovery of naturally infected *S. damnosum* with *Onchocerca volvulus* in the area.

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MATERIALS AND METHODS

- (a) Date of the survey and collection sites (Fig. 1)
 March 18–25, 1971: riverside of Gojeb, Kefa Province
 July 31–August 15: riverside of Didessa and adjacent plateau 1 km from the riverside, Ilubabor Province
 November 15–18 : riverside of Gojeb and Didessa
- (b) Catching method for the adult black flies
 Collection was made by two or three volunteers seated on a rock or the ground at the individual sites. All the black flies settled on the naked parts of the body were caught using a sucking tube every 30 minutes from sun rise to sun set.
- (c) Treatment and dissection of the flies
 Collected flies were anesthetized with ether and, in every 60 minutes, were gathered in batches in one small glass tube. After identification, the flies were dissected in a droplet of physiologic saline solution on a slide glass under a dissecting microscope in order to find the parasite.

Fig. 1 Map of Ethiopia showing the rivers where *S. damnosum* were collected.

RESULTS

As shown in Table 1, the infection rate of *S. damnosum* with the larvae of *O. volvulus* ranged from 20.0 to 40.6% at the several collection sites in Didessa area and ranged from 10.2 to 12.9% at the Gojeb riverside. The other species of black fly had not been found to be infected with filarial worms.

TABLE 1 Number of the naturally infected *Simulium damnosum* with the filarial worm, *Onchocerca volvulus*

			Gojeb		Didessa		
			riverside		riverside	plateau	
			Mar. 24	Nov. 18	Aug. 13	Nov. 15	Aug. 15
No. flies collected			85	127	726	5	32
No. flies infected			11(—)	13(8)	237(96)	1(0)	13(4)
Infection rate %			12.9	10.2	32.6	20.0	40.6
No. of infected flies harbouring several stages*	m		—	2	12	0	2
	s		—	3	116	1	6
	l		—	7	64	0	3
	m+s		—	0	13	0	1
	m+l		—	0	2	0	0
	s+l		—	1	29	0	0
	m+s+l		—	0	1	0	1

* Stage type of the larvae

m: microfilaria type

s: sausage type

l: late stage type

—: each stages not checked

Parenthesis: total flies possessing late stage type worm

In adult *S. damnosum* dissected, all the three developmental stages of *O. volvulus* i.e., microfilaria type, sausage type and late stage type were found. Of these three types, the sausage type was most abundant and this was followed by the late stage type and then microfilaria type. Finding the black flies possessing the late stage type is especially important from the epidemiological viewpoint.

In August 1971, at the Didessa riverside, out of 237 infected *S. damnosum*, 96 harboured the late stage worms. The body length measured ranged from 300 μ to 700 μ .

Regarding the frequency of harbouring worms in one dissected fly, usually only one type was recognized. In a few case, however, two or three types of filarial larvae were simultaneously found.

The highest number of the sausage type larvae recognized was 51, while that of the late stage type, 17.

Some smeared specimens were identified as the larval stage of *O. volvulus* by Dr. R. L. Muller, of London School of Tropical Medicine and Hygiene.

DISCUSSION

It has been already known that onchocerciasis is endemic in South-west Ethiopia (Cohen, L. B. 1960, Oomen, A. P. 1969, Iwamoto, I. et al. 1973). There is a general agreement that *S. damnosum* and *S. neavei* complex are the main vector of onchocerciasis in many tropical regions in Africa (De Meillon, B. 1957). Oomen, A. P. (1969), in particular, collected *S. damnosum* and *S. woodi*, and postulated that *S. damnosum* might be the vector of onchocerciasis in Ethiopia. Ogata, K. et al. (1970) reported that they collected seven anthropophilic *Simulium* species in Ethiopia and *S. damnosum* was recognized as the most common one.

Through our study, naturally infected *S. damnosum* with *Onchocerca volvulus* was abundantly found in natural population, whereas the other black fly species were found free from filarial larvae.

Thus, the present study brings an evidence that *S. damnosum* is the main vector of onchocerciasis in South-west Ethiopia, yet no possibility is denied if onchocerciasis could also be transmitted by the other *Simulium* species in this area. It is hoped that further studies will throw more light on this problem.

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エチオピア南西部において *Onchocerca volvulus* 自然感染の見られた *Simulium damnosum*

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エチオピアにおいては、とくに、その南西部にオンコセルカ病が存在することが知られ、また、他のアフリカ地域で、そのベクターと判明している、*Simulium damnosum*, *S. woodi* などのブユが生息することが確認されていたが、自然感染ブユは発見されなかった。筆者らは1971年同国に滞在し、8月と11月に行なった biting catch によって得た、野外の *S. damnosum* から、多数の *Onchocerca volvulus* を得た。

Gojeb, Didessa 両河岸から得た個体約1000のうち、975個体について解剖を行なった結果、前者で10.2～12.9%、後者で20.0～40.6%の陽性個体を得た。ブユ体内における *O. volvulus* の発育段階別では、sausage type のものが最も多かったが、約11%の個体が発育終期のものを保有していた。

biting catch によって採集されたブユは、ほとんどが *S. damnosum* であったこと、および、他種のブユからは全くフィラリアが発見されなかったことから、エチオピアにおいても、*S. damnosum* がオンコセルカ病の主要媒介種であるという確証を得た。

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