

A FURTHER REPORT ON THE PARASITES OF A SELECTED GROUP OF EQUINES IN PANAMA

A. O. FOSTER AND PEDRO ORTIZ O.*

From the Gorgas Memorial Laboratory, Panama, R. P.

During 1935, the writers made a quantitative study of the parasites of 48 equines owned by the Panama Canal Department of the U. S. Army (2). In 1936, a second series of 49 equines was made available from the same source. This was at once appreciated as an excellent opportunity to check upon the earlier findings as well as to augment materially the data upon certain interesting interpretations (3). Accordingly, this second group was studied in the same manner, except that detailed studies were made upon the Strongylid parasites in but 38 cases, as it was apparent that the findings already published were accurately representative of the true situation and the value of additional studies seemed doubtful. On the other hand, the data on the extra-*Strongylidae*, except *Probstmayria vivipara*, were completed for the entire group, bringing the number of animals in this series to 97, with quantitative studies on the *Strongylidae* of 86. Since these studies appear to be the first to study in detail a representatively large series of equines it has seemed desirable to summarize the data upon the entire group. This has been done in Tables 1 and 2 and Graph 1.

When studied in conjunction with the first report these data appear scarcely to require explanation. It may be noted that the number of Strongylid species has been increased from 32 to 34 by the recovery of *Cyathostomum tetracanthum* and *Oesophagodontus robustus*. The former was encountered once in the dorsal colon of a horse and the latter (5 specimens only) was taken from the dorsal colon of mules on three occasions. To the extra-*Strongylidae* have been added two tapeworms, *Anoplocephala magna* and *Paranoplocephala mamillana*, each of which occurred once in mules.

These records make it evident that the parasitic infestations of imported equines of the Canal Zone are not qualitatively different from those of native stock (1). The only difference in this respect is that *C. tetracanthum* has not been encountered in native animals, while *C. metami* has not been taken from imported equines, thus leaving the number of species the same from both groups. This similarity of parasitic fauna in two fairly isolated groups of equines suggests the probability of a cosmopolitan distribution of most of the equine species.

*The writers wish to record their indebtedness to Lt. Col. C. W. Greenlee, V. C., U. S. A., whose continued cooperation made this study possible and to acknowledge the technical assistance of Sr. Virgilio Ponce M.

TABLE 1.—Summary of quantitative data on the *Strongylidae* of 86 equines of the Panama Canal Zone

Species	Number Infested	Percentage Infested	Cecum	Ventral colon	Dorsal colon	Total	Preferred localization and per cent concentration
<i>Strongylus equinus</i>	69	80%	498	178	2	678	C. 75%
<i>S. edentatus</i>	65	76	68	484	6	558	V.C. 87
<i>S. vulgaris</i>	86	100	7,137	245	41	7,423	V.C. 96
<i>Triodontophorus serratus</i>	36	42	33	88	3	124	V.C. 71
<i>T. minor</i>	69	80	.....	971	113	1,084	V.C. 80
<i>T. tenuicollis</i>	13	15	.....	36	6	42	V.C. 86
<i>T. brevicauda</i>	13	15	.....	20	2	22	V.C. 91
<i>Oesophagodontus robustus</i>	3	3	.....	.....	5	5	V.C. 100
<i>Craterostomum mucronatum</i>	5	6	.....	.....	5	5	D.C. 100
<i>Cyathostomum tetracanthum</i>	1	1	.....	.....	1	1	D.C. 100
<i>C. coronatum</i>	72	84	3,381	179	8	3,568	V.C. 95
<i>C. labiatum</i>	52	60	7	1,696	20	1,723	V.C. 98
<i>C. labratum</i>	57	66	24	1,229	20	1,273	V.C. 97
<i>Gyalocephalus capitatus</i>	9	10	.....	15	.....	15	V.C. 100
<i>Ptyerostomum imperidentatum</i>	19	22	.....	.....	105	105	D.C. 100
<i>P. ratzi</i>	25	29	.....	.....	90	91	D.C. 99
<i>Cylicobrachyus brevicapsulatus</i>	2	2	.....	.....	2	2	D.C. 100
<i>Cylicocercus catinatus</i>	77	90	111	5,481	142	5,734	V.C. 96
<i>C. goldi</i>	76	88	12	13	2,925	2,950	D.C. 99
<i>C. pateratus</i>	56	65	4	1,489	22	1,515	V.C. 98
<i>Cylicodontophorus euproctus</i>	10	12	.....	.....	41	41	D.C. 100
<i>C. bicoronatus</i>	12	14	.....	.....	4	25	V.C. 84
<i>C. ultracinctus</i>	9	10	.....	.....	20	29	D.C. 100
<i>Cylicostephanus calicatus</i>	72	84	1,153	10,308	131	11,592	V.C. 89
<i>C. pocatus</i>	7	8	14	14	.....	14	D.C. 100
<i>C. minutus</i>	72	84	44	6,024	72	6,140	V.C. 98
<i>C. longiparsatus</i>	81	94	6	127	15,096	15,229	D.C. 99
<i>C. hebridus</i>	14	16	2	60	.....	62	V.C. 97
<i>C. asymmetricus</i>	5	6	.....	.....	6	7	D.C. 86
<i>Cylicocyclus radiatus</i>	16	19	.....	.....	1	42	V.C. 98
<i>C. elongatus</i>	8	9	5	5	1	11	V.C. 91
<i>C. nassatus</i>	79	87	491	17,883	396	18,770	C. & V.C. 95
<i>C. turgidus</i>	58	67	14	229	5,894	6,137	D.C. 96
<i>C. leptostomus</i>	44	51	15	478	10	503	V.C. 95
Total	86	100%	13,019	47,302	25,190	85,511	.....
No. different species .....	..	...	19	26	31	34	.....
Average	{ Number worms	.....	151	550	293	994	.....
	{ Number species	.....	5	11	5	13	.....

TABLE 2.—Summary of quantitative data on the extra-Strongylidae of 97 equines of the Panama Canal Zone

Species	No. infested	Percentage	Ave. no worms
<i>Oxyuris equi</i> ¹	32	33%	14
<i>Probstmayria vivipara</i> ²	57	66	..
<i>Parascaris equorum</i>	12	12	1+
<i>Habronema muscae</i>	72	74	21+
<i>H. megastoma</i>	8	8	4
<i>H. microstoma</i>	60	62	15+
<i>Setaria equina</i>	18	19	..
<i>Anoplocephala magna</i>	1	1	..
<i>A. perfoliata</i>	1	1	..
<i>Paranoplocephala mamillana</i>	1	1	..

Ave. no. different species per animal—3.

Ave. no. extra-Strongylid worms per animal—55+.

¹No. infested based upon the finding of either adults or 4th. stage larvae. No. worms based upon adults.

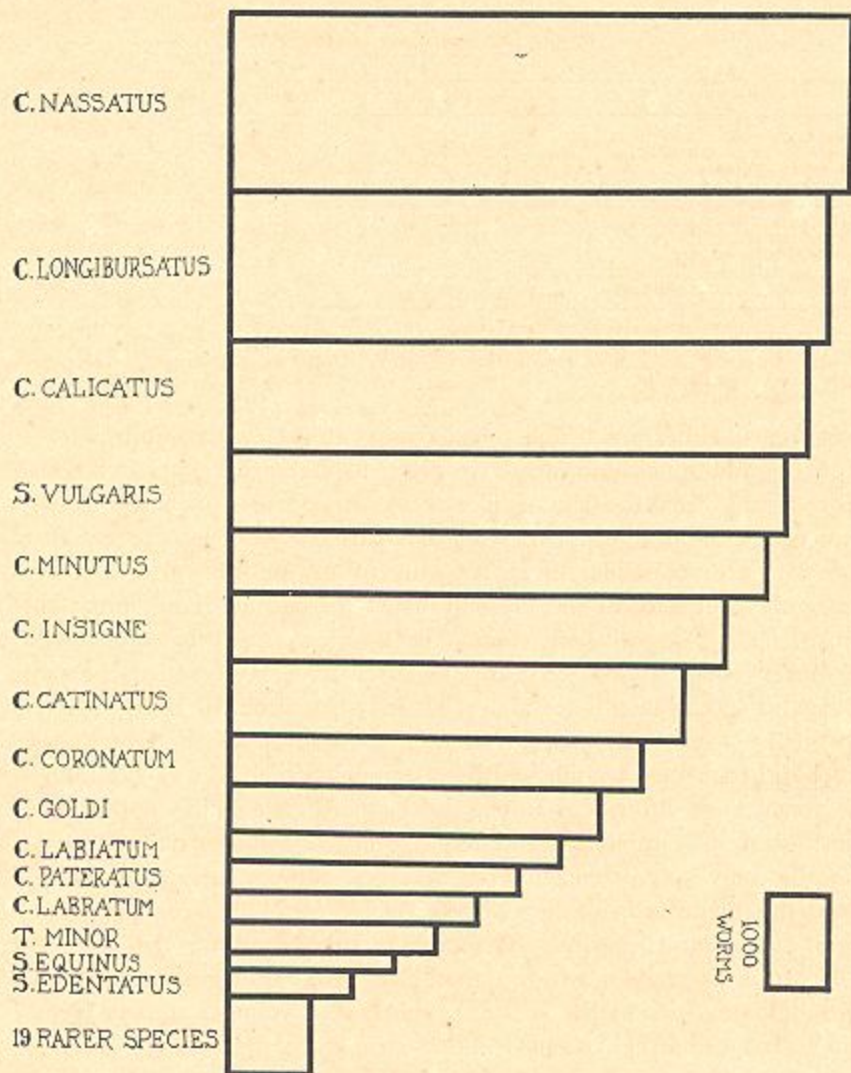
²Determined from 86 equines.

It seems neither practicable nor necessary to review the confirmations which the additional autopsies have given to the earlier interpretations. It is recognized that the data of the two reports, because of their different arrangement, do not permit of ready comparison, yet it is apparent that these data are accessible for rearranging in any desired order and are sufficiently complete, in the present report, to permit of all important comparisons. The so-called "commoner" species remain the same, as do the "rarer" ones, except that to the latter have been added the two Strongylid species mentioned above. It may be calculated from the data that the 15 "commoner" species accounted for over 98 per cent of the Strongylid parasites, a point which was emphasized in the earlier study. The quantitative differences among the 34 species are readily appreciated from a study of Graph 1. Moreover *Strongylus vulgaris* has continued to be the only species encountered at every autopsy, and *Cylicocycylus leptostomus* persists in being a "border-line" species between the "commoner" and "rarer" forms. The average infestation for the series is higher (994 Strongylid worms) than that given previously (849) but this is accounted for by the greater proportion of younger animals in the second group, and the data have shown clearly that the younger animals harbored the heavier worm burdens (3). Finally, it is felt that such quantitative variations as do exist are in the direction of increased accuracy in accordance with a substantial increase in the data.

To summarize the important findings on the 97 equines of this series the following facts may be reviewed:

1. Thirty-four species of *Strongylidae* were recovered, of which 15 accounted for about 98% of the Strongylid parasites. Fifteen was also the average number of species per animal.

2. Nineteen species occurred at one time or another in the cecum, but the average was 5. The 5 commonest species in this region accounted for 97% of the fauna viz., *S. vulgaris*, *C. coronatum*, *C. calicatus*, *S. equinus*, and *C. nassatus*.



Graph 1.—A representation of the relative abundance of the 34 species of Strongylidae from 86 equines. The data are given in Table 1.

3. Twenty-six species occurred in the ventral colon, but the average was 11. The 11 commonest accounted for about 98% of the fauna, viz., *C. nassatus*, *C. calicatus*, *C. minutus*, *C. catinatus*, *C. labiatum*, *C. pateratus*, *C. labratum*, *T. minor*, *S. edentatus*, *C. leptostomus*, and *S. vulgaris*.

4. Thirty-one species occurred in the dorsal colon, but the average was only 5. The 5 commonest accounted for over 97% of the fauna, viz., *C. longibursatus*, *C. insigne*, *C. goldi*, *C. nassatus*, and *C. catinatus*.

5. Ten species of extra-*strongylidae* were recovered, although 3 was the average per animal. The 3 commonest were *Habronema muscae*, *H. microstoma*, and *Probstmayria vivipara*.

6. No trematodes, lung-worms or "bots" were found.

REFERENCES

- (1) Foster, A. O. 1936.—Parasitic worms of equines in Panama. Proc. Helm. Soc. Wash., 3: 59-60.
- (2) 1936.—A quantitative study of the nematodes from a selected group of equines in Panama. Jour. Parasit., 22: 479-510.
- (3) 1937.—A relationship in equines between age of host and number of Strongylid parasites. Amer. Jour. Hyg., 25: 66-75.