

# FIFTY YEARS' PROGRESS IN THE TAXONOMY OF COCCIDIA (PROTOZOA : SPOROZOA) FROM INDIA

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(With 1 Table)

Coccidian parasites have attracted the attention of parasitologists since long, mainly because they produce a dreadful disease coccidiosis, which causes a heavy loss in the poultry, cattle, sheep and goats. In our country, research on coccidia was under way as early as the end of the last century, especially in the field of taxonomy, morphology and to some extent the life cycles.

During the fifty years existence of the Zoological Survey of India, it seems reasonable to assess the progress in the field of taxonomy of different groups of animal in India and the part played by this Institution. The present attempt is to review the results so far achieved in the field of taxonomy of Coccidian parasites in India, both from the invertebrate and vertebrate hosts.

The order Coccidia has representatives in all the major land realms of the world. Out of the total 38 genera, only 17 are represented in India, of which 3 are indigenous to this region and are monotypic. These seventeen genera comprise nearly 200 species (Table 1) of which 160 were described as new from India and the rest reported subsequently.

A little work has been done on the parasites of invertebrates. Uptil now, only seven species have been described. de Mello (1921) was the first to report a coccidian parasite *Adelia pachelabrae* from the snail, *Pachelabra moesta* Reeve. Subsequently, Ray and Das Gupta (1937) and Narasimhamurti (1960) described two more species of *Adelia* from centipedes. Setna and Bhatia (1934) reported *Aggregata* sp. from a prawn. Bhatia (1937) recorded *Adelina tribolii* from the beetle, *Tribolium farrugineum*. Ganapati (1945, 1952) described two species of *Myriospora* from Annelida.

A considerable amount of work has been done on the parasites of vertebrate hosts. For convenience, it is given hereunder group-wise.

## FISH

Halawani (1930 *a* and *b*) described *Eimeria southwelli* from shark. Setna (1933) reported Coccidia from fishes. Setna and Bana (1935*a* and *b*) observed *E. harpodoni* from Bombay-Duck. de Mello & Vales

TABLE 1—Showing the distribution of Coccidian parasites in different hosts from India.

Name of the Genera	Invertebrata					Vertebrata				
	Mollusca	Myriapoda	Insecta	Crustacea	Annelida	Fish	Amphibia	Reptiles	Bird	Mammals
1. <i>Aggregata</i>				1						
2. <i>Myriospora</i>					2					
3. <i>Lankesterella</i>							2			
4. <i>Tyzzeria</i>									2	
5. <i>Caryospora</i>								1		
6. <i>Isospora</i>							2	4	22	10
7. <i>Dorisiella</i>									6	
8. <i>Eimeria</i>						4	3	15	30	61
9. <i>Wenyonella</i>									5	1
10. <i>Octospoxella</i>								1		
11. <i>Pythonella</i>								1		
12. <i>Sivatoshella</i>									1	
13. <i>Adelia</i>	1									
14. <i>Adelina</i>		1	1							
15. <i>Haemogregarina</i>						1	3	13	†	
16. <i>Hepatozoon</i>									1	6
17. <i>Karyolysus</i>								1		

(1936) recorded *Haemogregarina thyrosoideae* from a freshwater eel after examining the specimen from Nova Goa. Chakravarty and Kar (1944) described *E. notopteri* from *Notopterus notopterus* and Chakravarty and Mandal (1961) reported *E. zygaenae* from a hammer-headed shark.

#### AMPHIBIA

Patton (1906 and 1908) and Shortt (1917) described Haemogregarines from the toads and frogs. Ray (1935) and Ray and Dasgupta (1935) observed two species of Coccidia from toad. Chakravarty and Kar (1952) recorded two more species from toads and frogs. Ray and Mitra (1942) reported *Eimeria himalayanum* from the Himalayan Toad.

#### REPTILIA

A few species of Coccidia are described by Simond (1901, *a, b, c* and *d*) from the gharials and crocodiles. Laveran (1902), Shortt (1917), de Mello *et al.* (1917), de Mello (1932) and de Mello and Meyrelles (1937) described Coccidia from the blood of lizards and tortoises. Laveran (1905), Patton (1908) Setna and Bana (1935), Bhatia (1936, 38) Knowles and Dasgupta (1935 *a & b*), Mitra and Das Gupta (1937), Das Gupta (1938), Chakravarty and Kar (1943, 48) described several species from reptiles. Ray and Das Gupta (1936, 37) described two species of *Eimeria* from snakes and a genus *Pythonella* from the python. In 1942 Ray and Raghavachari described another genus *Octosporella* and Ray, Raghavachari & Sapre (1942) described a species *E. minetti* from *Mabuia*. Chakravarty and Kar (1947) reported *Caryospora gekkonis* from the wall Lizard. Mandal (1966) described *Isospora rayi* from a lizard.

#### AVES

Maximum work has been done on avian parasites. Adie (1908) described a species of *Hepatozoon* from the blood of a House sparrow. Hoare (1924) observed another coccidia from an Indian eagle. de Mello and Afonso (1935) reported Haemogregarine from a bird. Mitra and Das Gupta (1937), Malhotra and Ray (1961) and Chatterjee and Ray (1969) recorded Coccidia from pigeon. Naik (1937) observed coccidiosis in crow. Kar (1944), Chakravarty and Kar (1944, 47), and Misra (1944, 47) described several species from different avian hosts. Chakravarty and Basu (1946) recorded *Tyzzeria alleni* from a Cotton Teal. Ray (1945) Gill (1959) and Nath *et al.* (1960) observed Coccidia from Chick. Ray (1952), Ray *et al.* (1952 *a* and *b*) noted some parasites from hill birds. Ray and Hiregauder (1959) described some species of avian Coccidia. Dubey and Pande (1963 *a* and *b*), Bhatia and Srivastava (1965) and Sarkar and Ray (1965) recorded few species from domestic duck. Mandal and Chakravarty (1963) described *Dorisiella vagabundae* from Indian Tree-pie. The same authors (1964) recorded some species of *Isospora* from Indian birds. Mandal (1965) reported five species of *Eimeria* with a subspecies of *E. recoviensis* (Labbe) from avian hosts.

Banik and Ray (1961, 64) described *E. pavonina* and *E. mandali* from Indian peacock. *E. pavonis* and *E. cristata* have also been described by Patnaik (1965) from Indian peacock, which are now synonymized with *E. pavonis* Mandal 1965 and *E. patnaiki* Ray 1965. Bhatia and Pande (1965 *a* and *b*) recorded avian coccidia from Mathura. Ray and Sarkar (1967, 68) described some species including *Dorisiella chakravarti* and *D. mandali* and the genus *Sivatoshella* from some passerine birds.

#### MAMMALIA

Laveran (1905) reported *Hepatozoon* from rodents. A *Leucocytozoon* (= *Hepatozoon*) was also described by Adie (1906) from *Mus rattus* (= *Rattus rattus*). Patton (1908) reported coccidia from different orders of mammals. Christophers (1912) observed this parasite from wild dog. Cooper (1924, 1926 *a* and *b* 1927), Cooper and Gulati (1926), Rao (1952) Rao and Hiregauder (1954), Hiregauder (1956) Rao and Bhatawadaker (1959) Gill (1960 *a* and 1968) observed bovine Coccidiosis. Mandal and Ray (1961), Patnaik and Ray (1961), Gill, Chhabra and Lall (1963), Patnaik (1964) and Patnaik and Pande (1965) studied this parasite from buffalo. Gill (1960 *b*), Srivastava and Shah (1968) reviewed the parasites from domestic pig. Rao (1925), Aiyar (1937)-Ray and Banik (1965) and Mukherjee and Krassner (1965) described this parasite from *Canis*. Knowles and Das Gupta (1934), Mandal and Ray (1960) reported coccidia from feline group. Kar (1943) and Shah (1965) reported coccidia from goat. Ray and Das Gupta, (1935, 1937), Ray and Singh (1949, 1950) Gill and Ray (1961), Ray and Banik (1965) and Ray, Banik and Mukherjee (1965) observed coccidia from rodents and lagomorphs. Dubey and Pande (1963 *a* & *b*, 1964*a*) recorded this parasite from camel. The same authors (1964*b*) Knowles and Das Gupta (1931), Patnaik and Ray (1965) reported coccidia from Mongoose. Das Gupta (1934), Mukherjee (1948) noted human coccidiosis.

#### SUMMARY

The coccidian parasites have been a subject of active investigation since the first one was seen by Leuweenhook in 1674. Hundreds of species have been named but their actual number may well be in the tens of thousands.

Coccidian parasites present in the diverse Indian fauna are varied. Uptil now seventeen genera comprising nearly two hundred species have been recorded from this country and most of them are described within the last fifty years. Irrespective of different climatic zones of India, the coccidian parasites are quite frequent.

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