

## **Studies on taxonomy of parasitic tick genus *Hyalomma* (Ixodida: Ixodidae) from Aurangabad district M.S. India**

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### **Abstract**

The present study deals with the taxonomy of species of Genus *Hyalomma* from Aurangabad district of Maharashtra, India. Genus *Hyalomma* is parasitic ticks of various domestic animals. The present study was carried out on ectoparasitic ticks of milch cattles of Aurangabad district from June-2015 to May-2016. Total three species of genus *Hyalomma* such as *Hy. Anatolicum*, *Hy. Marginatum*, *Hy. Impeltatum* were identified as per the keys and descriptions given by Wall. R and Shearer. D (1997). Soulsby E. J. I (1982). Hoogstraal (1965). and Asadollah Hosseini-Chegeni (2013).

**Keywords:** taxonomy, genus *Hyalomma*, ectoparasitic ticks, Aurangabad

### **Introduction**

Ticks belonging to Phylum Arthropoda, Class Arachnida, subclass Acari, and family Ixodidae. The arthropods contain over 80% of all known animal species and occupy almost every-known habitat. As a result of their activity, arthropod ectoparasites may have a variety of direct and indirect effects on their hosts' [1]. Approximately 900 tick species have been described, divided among the Ixodidae, Argasidae, and Nuttalliellidae, of which about 10% of Ixodidae and Argasidae families are of clinical significance [2]. Eighty percent of the world tick fauna are hard ticks and with the exception of one tick species in family Nuttalliellidae, the remaining are soft ticks. Ten percent of the total hard and soft tick species are known to cause disease transmission in domestic animals and humans [2]. Moreover, ticks can cause transmission of viral, bacterial and protozoan pathogens causing diseases like hemorrhagic fever, Ehrlichiosis, Anaplasmosis, Theileriosis, and Babesiosis in meat and dairy animals [3]. Currently, the genus *Hyalomma* comprises three taxonomic subgenera: *Hyalomma* (type subgenus: *Hy. dromedarii*), *Hyalommina* (type subgenus: *Hy. rhipicephaloides*) and *Hyalommasta* (type subgenus: *Hy. aegyptium*) [4]. However, Filippova (1984) considers just two subgenera: *Hyalommasta* (type species: *Hy. aegyptium*) and *Euhyalomma* (type species: *Hy. dromedarii*). The present study mainly reviews taxonomic status, distribution, and host and disease relationship in nine *Hyalomma* species: *Hy. Aegyptium*, *H. anatolicum*, *Hy. Asiaticum*, *Hy. detritus*, *Hy. Dromedarii*, *Hy. excavatum*, *Hy. Marginatum*, *Hy. rufipes* and *Hy. schulzei*. Finally a taxonomic key is constructed to the native *Hyalomma* species of Iran. [5]. The *Hyalomma* tick fauna of the Indian area is characterized by the presence of several distinct, endemic species as well as by the small size of individual ticks in local populations of species widely distributed in this area and elsewhere in Asia, Africa, and southern Europe [4]. The most comprehensive study of Indian ticks was done by Sharif (1928). Later Hoogstraal *et al.* (1962-1971) made extensive studies on Ixodida and till date, approximately 107 species and 12 genera have been known from India.

This shows that approximately 13% of total species of ticks of the world are found in India.

*Hyalomma* ticks are also known to be involved in the transmission of rickettsiae, such as *Rickettsia conori* Caminopetros and Brumpt, 1932, causing tick typhus and *Coxiella burnetii* Derrick, 1937, causing Q-fever (Hoogstraal, 1967a). The impact of ticks on human economy merits special consideration as they affect the health of man and his domestic wealth directly and indirectly. Although widely recognized as pests, ticks are best known for their notorious vector status. Despite their medical and veterinary importance, ticks remained as an unstudied group in India till 1928. The genus *Hyalomma* comprises 30 species, most of which follow a three-host life cycle. However, some species undergo either a two-host or a three-host cycle, depending on species [2]. The pioneering work of Sharif which resulted in the publication of an identification key to Ixodid ticks formed the basis for subsequent studies on various aspects of Indian tick fauna [6]. In some cases, ticks have been reported to cause lowered productivity, mortality [7]. Transmit such diseases as Babesiosis, Theileriosis, and Anaplasmosis etc. [8]. Ticks which usually attack cattle are *Boophilus* spp., *Haemaphysalis* spp., *Rhipicephalus* spp., *Hyalomma* spp., *Amblyomma* spp., *Dermacentor* spp., (Hoogstraal *et al.* 1966). *Hyalomma* ticks are well-known vectors of protozoan diseases such as theileriasis and babesiosis affecting cattle and buffaloes in India [9].

The objectives of the study were to collect and identify the different species of *Hyalomma* genus from Aurangabad district of Maharashtra India.

### **Material and Methods**

The present study was conducted from June-2015-May-2016, in Aurangabad district Maharashtra, India. The random sampling was performed for this study in Aurangabad district from which 1-6 cattle were thoroughly investigated by close inspection, parting the hairs against their natural direction for the detection of ticks. Ticks were collected from the different part of the body of the

individual cattle by hand picking, when required, use small hairbrush dipped in ethanol was used for the collection of ticks. Ticks were preserved in 70% alcohol in clean, well stopper glass vials which were labeled properly. Morphology of ectoparasites was studied in the laboratory under stereomicroscope, by putting the tick on petridish and using brush, the mouth part, ornamentation coxa spur, the presence of festoon, punctuation distribution leg coloration, posterior median strip arrangement, genital aperture and base of capituli used for identification of ticks genera as per the procedure recommended by [10]. Ectoparasites were identified according to the keys and description given by [1, 5, 11, 12, 13].

**Result and Discussion**

During present study three species belonging to genus *Hyalomma* were reported such as *Hyalomma* genus that is *Hy. anatolicum*, *Hy. marginatum*, *Hy. Impeltatum*.

**Taxonomy**

- Phylum : Arthropoda.
- Class : Arachnida.
- Subclass: Acari.
- Order : Ixodida.
- Family : Ixodidae.
- Genus : *Hyalomma*.

**Keys to the genus *Hyalomma***

1. Anal grooves surrounding the anus posteriorly.
2. Long mouthparts.
3. Eyes present.
4. Festoon absent or present.
5. Males with a pair of adanal shields and two posterior abdominal protrusions.
6. Adanal shields absent or present.....*Hyalomma*.

**Description**

The ticks belong to *Hyalomma* genus have long mouthparts on anterior region. The palp articles 2 which are longer than article 1 and 3. The basis capituli has medium angular lateral margins. The legs usually have pale rings. The legs are slender. The pulvilli are always present. The scutum is present in the female and a conscutum is present in the male and they are brown in coloured. (exception *Hy. lusitanicum*). The eyes are always very convex. The festoons are present in males and in females but unclear when females are fed. The spiracular plates are large posterior to legs 4. The ventral plates are present in males only, usually three distinct pairs. The anal groove is posterior to the anus. The coxae 4 are of normal size. The coxae 1 have large and equal paired spurs.

**Keys for species of *Hyalomma* genus**

1. Long mouthpart. Conscutum is dark or dark brown in coloured. Lateral grooves are long, or they continuing towards eyes lines of punctuation, central festoon is dark or pale in colour. -----2
  - Long mouthparts, conscutum is yellow orange in colour, lateral grooves are short, central festoon is pale in colour. -----3
2. Pale ring is present, legs are dark brown in colour they have pale colour patches on the dorsal surfaces of leg, Punctuation is small, punctuation distribution is dense, large punctuation also found on posterior ridges, Subanal

plate alignment is with adanal plates. Adanal plate shape has square end. ----- *Hyalomma marginatum*.

- Central festoon is pale colour, Leg is brown in colour and pale ring is present but not clear, punctuation size is large, punctuation is dense and distributed on cervical fields and lateral grooves, Subanal plate alignment is move outside the line of the adanal plate, adanal plate shape has square ends. -----  
-----*Hyalomma. impeltatum*.

3. Paracentral festoons (parma) are separated anteriorly, leg colorations is with pale rings, larger punctuation at the lateral grooves, Subanal plate alignment is with the adanal plates, Subanal plates are small and indistinct, Adanal plate shape has round ends. -----  
-----*Hyalomma anatolicum*.

***Hy. anatolicum* (Koch, 1844)**

**Description**

*Hyalomma anatolicum* is important over widely scattered areas from North Africa to India as a vector of the causative organism of tropical Theileriosis of cattle. [14]. The cattle, also sheep, goat, camels, horses, and donkeys are fed on by adult *Hy. anatolicum*. Adult feed on cattle in the axillae and groin, the genital areas and perineum and the udder. The Pigmentation (color) of parma as a suitable taxonomic character for the differentiation of *H. anatolicum* and *H. marginatum* is nearly variable in different population that may be seen as pale, semi-pale, semi-dark and dark [15]. The eyes are present which are very convex. The mouthparts are long, lateral grooves are short, Cervical fields are visible, central festoon is pale in colored, paracentral festoons (parma) are separate anteriorly, posteromedium grooves are present which is long and narrow, leg coloration is with pale rings, punctuation sizes are small. Punctuation distribution is sparse, but with some concentrations of larger punctations at the lateral grooves. Genital aperture anterior groove is shallow. Subanal plates alignment is with the adanal plates. Subanal plates are small and indistinct. Adanal plates shape has a round end. Spiracle areas have sparse setae. *Hyalomma anatolicum* in India reported in Delhi, Himachal Pradesh, Gujarat, Madhya Pradesh, Bhaironghata, Andhra Pradesh, Hyderabad. [4].

***Hy. marginatum* Koch, 1844**

**Description**

*Hyalomma marginatum* is also known as The Mediterranean *Hyalomma*. The scientific name “marginatum” derived from “margin” refers to the lateral grooves that run as lines of punctuations near the margin of scutum and may be seen as a marginal rim. *H. marginatum* was described by C.L. Koch in 1844. Then, it was considered as subspecies *H. m. marginatum* by Schulze and Schlottko (1930), and Hoogstraal and Valdez (1980). *Hy. marginatum* has dark brown in coloured conscutum, Eyes are present, lateral grooves are long, they continue towards eyes as lines of punctations. Cervicle fields depression is (visible) apparent. Mouthparts are long, posterior ridges number two and caudal depression is present but shallow. Paracentral festoons are separate anteriorly. Central festoon is dark coloured as like of the paracentral festoons. Posteromedium grooves are present which are long and paramedium grooves are present which are small. The legs are dark brown in coloured and they have pale coloured patches on the dorsal surface of leg.

Punctuation size is small, punctuation distribution is denser. Genital aperture anterior groove is deep. Subanal plate alignment is with adanal plates subanal plates are distinct but small. Adanal plates shape has square ends. Spiracle areas have sparse setae. *Hyalomma marginatum* reported in India, Delhi, Madhya Pradesh, Maharashtra, and Gujarat [4].

***Hy. impeltatum* Schulze and Schlottke, 1930**

**Description**

*Hyalomma impeltatum* is more similar to *Hyalomma dromedarii* in morphological features, hosts, and geographical areas. The conscutum of *Hy. impeltatum* is dark in coloured. Eyes are present. The cervical fields depression is visible but it is small. Lateral grooves are long and distinct grooves and continuing towards eyes lines of punctations. The caudal depression is present. And posterior ridges number in two. Central festoon pale in colored. Paracentral festoons are separate anteriorly. Posteromedian grooves is present which are long. Paramedian grooves are large. Leg is brown in colour and pale ring is present but not clear. Punctuation size is large. The punctuation is dense and distributed on cervical fields and lateral grooves. The numerous punctuation is present around the caudal depression. Genital aperture anterior groove is deep. Subanal plate alignment is move outside the line of the adanal plates and beyond the posterior margins of the body. Subanal plates are distinct. Adanal plates shape has square ends. Spiracle areas have sparse setae. Redescription of *Hyalomma impeltatum* reported that cervical and lateral grooves moderately deep, up to 1/3 length of conscutum; marginal grooves short; posteromedian groove does not reach parma and is separated from parma by smooth or wart-like surface; paramedian grooves well defined; large punctations sparse, mainly on central, caudal and lateral fields; parma generally present. [16]. *Hyalomma impeltatum* are distributed in North, West and East Africa, West Asia, Iraq and Pakistan [9].

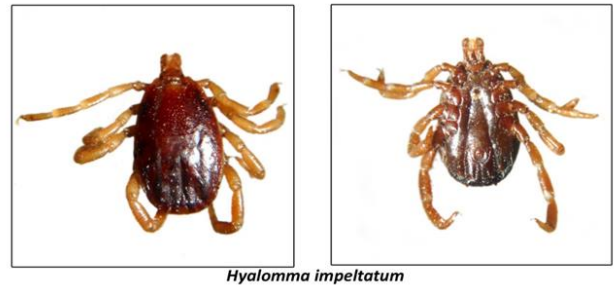


Plate 1

**Conclusion**

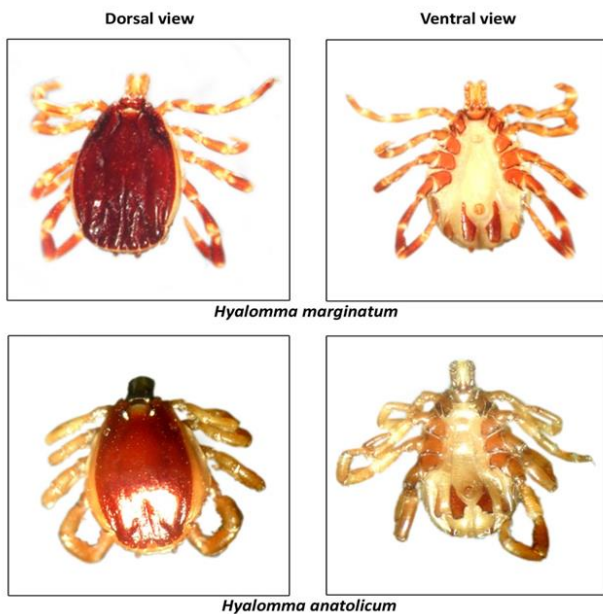
During present study three species belonging to genus *Hyalomma* such as *Hy. anatolicum*, *Hy. marginatum* and *Hy. impeltatum* were first time reported in Aurangabad district M. S. India.

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