INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE & TECHNOLOGY
© VISHWASHANTI MULTIPURPOSE SOCIETY (Global Peace Multipurpose Society) R. No. MH-659/13(N)
www.vmsindia.org

Morphology of female genital organs of three spider species from genus Neoscona (Araneae- Araneidae)

Sonali P. Chapke, Bhagat Vijay*. B and Raja. I. A.
Shri Shivaji college of Art Commerce and Science, Akola
*Shri Shivaji College, Akot. sc7881@gmail.com

Abstract
The morphology of the female genitalia is assumed to play a crucial role in shaping the sperm priority patterns in spiders that probably are reflected in the mating behavior of a given species. We examined the morphology of virgin females' genitalia by means of light microscopy of cleared specimens. The female epigynal plate, of three species of genus Neoscona : *Neoscona theisi, Neoscona sinhagadensis and Neoscona rumpfi* were dissected out, and internal ginataila are exposed and described. In all three species the internal genitalia, consist of a pair of spermatheca provided with fertilization duct, and copulatory duct. Species specific variations are reported, in the epigyne and internal genitalia. The epigynal plate in *N.theisi, and N.rumpfi* have a length of aboutn0.9 mm while ventral length in *N. sinhagadensis was* 0.75mm.Though the scape is found all the three species but its size and shape varies.
Key words*: Neoscona, genital morphology, epigynum, Scape, spermatheca*

Introduction:

The female genital structure, or epigynum, is a hardened plate on the underside of the abdomen in a female spider. It is closely associated with the gonopore. It is typically very dark and heavily sclerotized, however, and thus seem unlikely to be bent by the forces applied by male palps during mating. Epigyne also have a more or less distinct projectile sclerites from the base of the epigyne called scape, others are either plate like or with a median septum instead of scape. During mating sperm are transferred into the epigynum, which then move into receptacles (spermatheca) that connect to the oviducts. Eggs are fertilized as they pass through the oviducts and out through the gonopore.In the plesiomorphic "haplogyne" condition, sperm are introduced through the same opening that is used for oviposition .The spermathecae of haplogyne spiders have only a single duct, through which sperm both enter and exit the spermathecae (Austad, 1984). In the derived, entelegyne condition, a copulatory duct which connects each spermatheca with the outside is used to introduce sperm into the spermatheca, and a separate "fertilization" duct, running from the spermatheca to the uterus, is used to transfer sperm to the eggs (Codington and Levi, 1991). While male spider genitalia are universally paired, the female genitalia vary. A few Mesothelae have a single spermatheca, and in some other "primitive" species the female has a pair of receptacles but the male can fill both with a single palp (Haupt, 2003; Costa *et al.,* 2000).

The genus Neoscona of spiders is similar to Caerostris being nocturnal and cryptically colored. It is also referred to as the hairy field spider or orb-web spider and has a globosely (round) abdomen which overhangs the carapace. The orb-web is constructed at night, shortly after dark. Once complete the host will position herself head down at the hub (centre) of the web waiting for prey to fly into the web. Insects are attracted to the window light and it is quite remarkable how the spider knew to select such an unnatural but useful site. At the first sign of sunrise, or be fooled at the rise of a full moon, the spider will remove its web only leaving the bridge line and a few supporting threads for construction next evening. There are 116 accepted species of genus Neoscona though out the world, (World spider catalog, 2017). Tikader and BAL (1981) reported 16 species of Neoscona from India.

The generalized morphology of female genitalia or epigyne in genus *Neoscona* revealed it as a simple tongue like plate. The scape is present but completely fused to the base and provided with one or two pairs of lateral lobes. The epigynal openings situated underneath of Scape. As epigyne is the most specific characters, it is authentically known that the differences in the structure of both external and internal are the best way for distinguishing one species of female spider from other. In the present paper we described the morphology of epigyne in three species of genus Neoscona : *Neoscona theisi, Neoscona sinhagadensis and Neoscona rumpfi*, collected from Akola district of Maharashtra, India. Such Studies on the genital morphology of spiders help in better understanding of many issues in evolutionary biology, such as sexual selection (Uhl 2000; Eberhard 2004; Berendonck and Greven 2005)

Materials and Methods

Females of, Neoscona *theisi, Neoscona sinhagadensis and Neoscona rumpfi*, spiders were collected in and around Akola district during September 2011 to January 2012. All specimens were alive and were moved to the laboratory. The

specimens were identified by using a Carl-Zeiss Stereo-Zoom microscope. The identification was confirmed with the help of available keys and using picture key of Tikader and Bal (1981). The female genitalia were dissected out by giving a cut in the genital region on the ventral side of the abdomen. Epigyne was then cleared in 10% KOH aqueous solution until all the tissue was dissolved. Cleared specimens were finally transferred into glycerin and checked with a light microscope. They were photographed, using a digital camera.

Result and Discussion:

Neoscona rumpfi is a small spider just 17.00 mm in length with dark brown Cephalothorax, grayish brown abdomen and legs are yellowish in color. The epigynum of *Neoscona rumpfi (Fig.1), is* an arched and heavily sclerotized plate with a length of 0.9 mm ventrally. It is situated on the ventral side of the female's abdomen. Epigynal scape with constriction at the bending point and provided with a pair of conspicuous horn like lateral lobes ventral side of the epigyne provided with a median bulge. The spermatheca is paired and with both copulatory and fertilization ducts.

Neoscona sinhagadensis is also smaller spider with a total length of just 12.00 mm. The generalized color of Cephalothorax and legs, are yellowish brown and the abdomen appeared yellowish white in color. The epigynum of N. *sinhagadensis* (Fig. 2), is also highly sclerotized plate, on the ventral side of opisthsoma, close to the gonopore. Along ventral side it is comparatively longer with a ventral length of 0.75mm. It has a scape, with an atrium on both sides. It is provided with prominent, wide rim and is without constriction. There are two spermathecae on each side, both are oval slightly oblique and thumb-like. Both spermathecae extend from a massive U-shaped structure.

Neoscona theisi *is very minute spider with total length of just 9.80 mm. It's Cephalothorax and legs, were yellowish brown colored and the abdomen brownish white.* The epigyne (Fig. 3) is flattened sclerotized plate its ventral length is 0.9 mm. epigyne have a moderately long *Scape which become* slightly narrow constricted near the base. It is also *provided with prominent rim and a constriction at the middle.* One pair of conspicuous lateral lobes appeared horn like. The spermatheca with its both copulatory and fertilization duct appeared very prominent.

References:

Austad, S.N. (1984). Evolution of sperm priority patterns in spiders. In: Sperm competition and
the evolution of mating systems (R.L. Smith ed.), pp. 223-249. Harvard University Press,
Cambridge, Massachusetts.

Berendonck B, Greven H (2005) Genital structures in the entelegyne widow spider Latrodectus revivensis (Arachnida; Araneae; Theridiidae) indicate a low ability for cryptic female choice by sperm manipulation. J Morphol 263:118–132.

Codington, J.A. and Levi, H. W. (1991). Systematics and evolution of spiders (Araneae). Annual Review of Ecology and Systematic 22,565-92.

Costa, F. G., Pérez-Miles, F. and Corte, S. (2000). Which spermatheca is inseminated by each palp in Theraphosidae spiders?: a study of Oligoxystre argentinensis (Ischnocolinae). Journal of Arachnology 28, 131–132.

Eberhard, W. G. (2004) why study spider sex: special traits of spiders facilitate studies of sperm competition and cryptic female choice. J Arachnol 32:545–556.

Haupt, J. (2003). The Mesothelae—a monograph of an exceptional group of spiders (Araneae: Mesothelae). Zoologica 154, 1–102.

Tikader, B. K. and Bal, A., (1981). Studies on some orb– weaving spiders of the genera Neoscona Simon and Araneus Clerck of the family Araneidae (=Argiopidae) from India. Rec. Zool. Surv. India, Occ. Pap., 24: 1–60.

Uhl, G. (2000) Female genital morphology and sperm priority patterns in spiders (Araneae). In: Toft S, Scharff N (eds) European Arachnology 2000. Aarhus University Press, Aarhus, pp 145–156.

The World Spider Catalog. (2017). Gen.Neoscona,Simon,1864 [urn:lsid:nmbe.ch:spidergen:01529], http://www.wsc.nmbe.ch/genusdetail/365

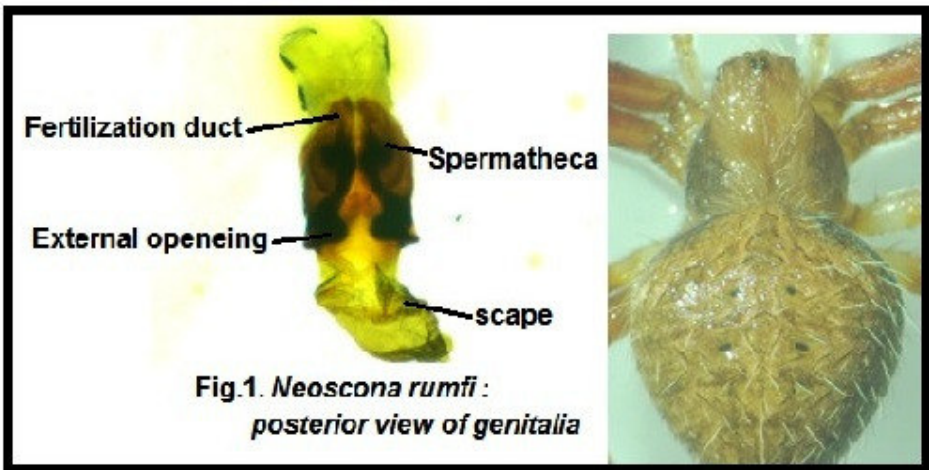

Fig.1. *Neoscona rumfi : posterior view of genitalia*

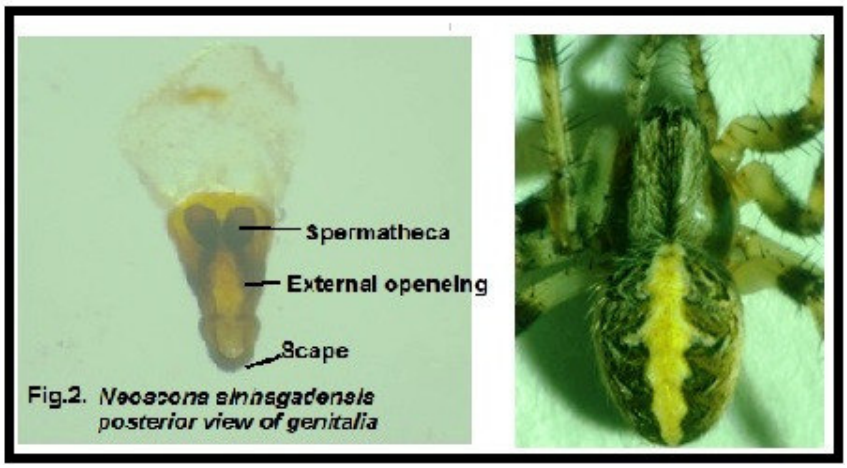

Fig.2. *Neoscona sinnagadensis posterior view of genitalia*

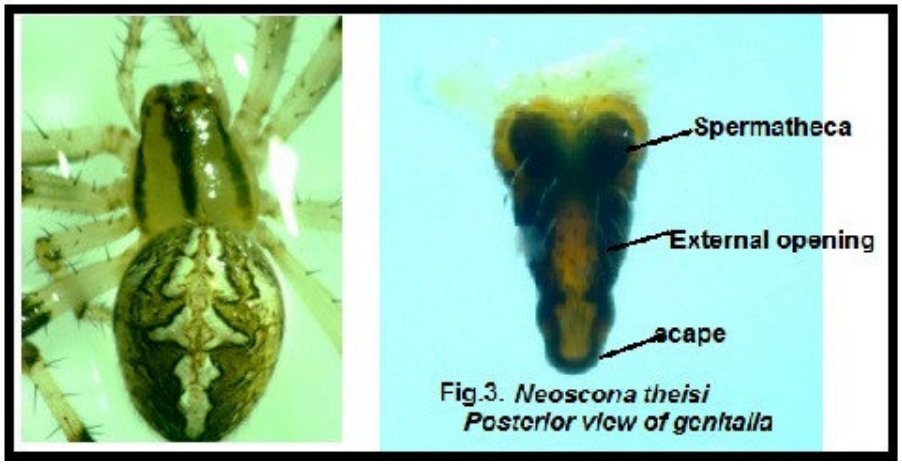

Fig.3. *Neoscona theisi Posterior view of genitalia*

❖❖❖❖