the size of conidium, number and nature of appendages, ascus size (including the L/B ratio) and the number of ascospores per ascus. The morphometric data of the parasite of *P. nigra* with that of *U. adunca* collected from species of *Salix* and *Populus* from Kashmir have been tabulated in table 1.

The table is revealing in two ways; on the one hand, it highlights the differences between forms of *U. adunca* parasitic on species of *Salix* and *Populus*, and on the other, it reveals the novelty of the mildew recovered from *P. nigra* during the present studies. These differences and morphological peculiarities warrant separate treatment for the species. Accordingly, it has been named *U. populi* sp.nov. after its host. Thus in Kashmir, *Populus* spp. are infected by two species of *Uncinula, viz., U. populi* and *U. adunca.*

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THE SPECIES STATUS OF *HELIOTHIS ARMIGERA* (HUB.) (LEPIDOPTERA: NOCTUIDAE) IN ANDHRA PRADESH, INDIA ON THE BASIS OF AEDEAGAL CORNUTAL SPINES

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BHATTACHERJEE[1] reported that *Heliothis armigera* in India is comprised of three sub-species—*H. armigera hibisci* feeding on cotton and bhindi, and male moths possessing 11 aedeagal cornutal spines; *H. armigera sorghi* feeding on sorghum, maize and wheat, and male moths possessing 12 aedeagal cornutal spines; and *H. armigera armigera* feeding on gram and tomato, and male moths possessing 13 aedeagal cornutal spines. Later, Bhattacherjee and Gupta[2] described a new species on cotton as *H. rama* with 13 aedeagal cornutal spines. Vaishampayan[3] discovered no such differentiation in *H. armigera* in Madhya Pradesh (central India) and reported it as a single species on all the host crops.

To clarify the taxonomic situation in Andhra Pradesh, the larvae of *H. armigera* were collected on sorghum, pigeonpea and chickpea and reared further in the laboratory to obtain moths. One more generation was bred from these moths in the laboratory on the same natural hosts. Aedeagal cornutal spines of 25 male moths of each reared and bred generations were counted under binocular by dissecting out the genitalia from abdomen boiled for 2 to 3 min in 5% KOH. The male moths obtained in light traps during different crop periods at ICRISAT Centre were also examined for the aedeagal cornutal spines.

The number of stout spines on the aedeagal cornuti of both the reared, bred, and light trap-collected male moths varied from 10–15, with 11–13 spines most common (tables 1 and 2). There also appeared numerous small spines in the vesica beneath these stout aedeagal spines. The moths varied in morphological characters including the wing expanse; the larvae of the same instars also showed colour variation.

This study reveals that the number of aedeagal cornutal spines in *H. armigera* is not constant, and

Table 1 *Percent of H. armigera male moths*, reared (R) and bred (B) on sorghum, pigeonpea, and chickpea, against aedeagal cornutal spine numbers, ICRISAT Centre, 1976–77.*

Spines on aedeagal cornuti (No.)	Sorghum		Pigeonpea		Chickpea	
	R	B	R	B	R	B
10	0	0	16	4	0	4
11	4	8	36	36	16	20
12	52	40	20	36	56	52
13	36	40	20	8	24	12
14	4	12	8	16	4	12
15	4	0	0	0	0	0
Cumulative mean	12.5	12.6	11.7	12.0	12.2	12.1

* = Twenty-five moths of each of the reared and bred were studied.
R = reared from the field collected larvae.
B = bred on the same natural host for one generation

Table 2 *Percent of male moths with different number of spines on aedeagal cornuti, obtained from the light trap during crop seasons, ICRISAT Center, 1976–77.*

Spines on aedeagal cornuti No.	No. of moths (%)		
	Jul.–Oct.[a] (n = 65)	Nov.–Jun.[b] (n = 98)	Mar.–Jun.[c] (n = 79)
10	7.7	9.2	5.1
11	23.1	31.6	34.2
12	46 2	32.7	32.9
13	20 0	23.4	21.5
14	1.5	3.1	6.3
15	1.5	0.0	0.0

n: No. of male moths obtained and studied
a: Crops available – groundnut, sorghum, and pearl millet
b: Crops available – pigeonpea, and chickpea
c: Crops available – rabi groundnut, sorghum, and weeds

vary more or less in the same narrow range with the host plants; and therefore, it should not be taken as criterion to name subspecies of *H. armigera* feeding on different crops, as has been done by Bhattacherjee[1].

We, further, got identified the species of *Heliothis* in Andhra Pradesh, India by sending the moths obtained from different hosts to Dr D. F. Hardwick, Entomological Research Institute, Canada. There were three *Heliothis* species in the lot namely-*Heliothis* (= Helicoverpa) *armigera* on almost all host plants, *H. peltigera* mainly on safflower and the weed *Acanthospermum hispidum*, and *H. assulta* on the weed *Datura metel*. It needs to be mentioned here that the generic name *Helicoverpa* coined by Hardwick[4] for *Heliothis* has not been approved by the International Commission on Zoological Nomenclature, and there is a representation by Nye[5] following a referendum among the participants of the "International Workshop on *Heliothis* Management" held in November 1981, at ICRISAT, Patancheru, A.P., India, that the well established *Heliothis* spp names including *armigera*, *peltigera*, and *punctigera* should continue to be used.

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EFFECT OF OX BILE ON THE FORMATION OF CALCAREOUS CORPUSCLES DURING *IN VITRO* GROWTH OF *HYMENOLEPIS MICROSTOMA*

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THE scoleces of three species of cestodes *e.g. Hymenolepis microstoma*, *H. diminuta* and *H. nana* remain attached to the bile duct, duodenum and posterior third of the gut[1], respectively. In the former species, the major portion of the mature and all the gravid proglottids, however, remain hanging in the duodenum. The different regions of the gut in which these cestodes inhabit contain a decreasing gradient of bile and pancreatic juice. It has been demonstrated *in vitro* by us that pancreatin apparently has no effect on the numbers and sizes of the calcareous corpuscles[2]. In the young adults of *H. microstoma* these structures increase in numbers as soon as they come close to the bile duct[3]. The concentration of bile which produces maximum increase in the formation of calcareous corpuscle in cestodes, remained a gap in our knowledge. In the present *in vitro* experiment, the effects of various concentrations of ox bile (rich in bile acids and bile salts) on the formation of calcareous corpuscles in *H. microstoma* was studied.

The Eagle's basal medium containing horse serum and fresh liver extract from lamb as described earlier by us[4] was used. The distribution of corpuscles was estimated from the last ten proglottids excluding the end-proglottid of worms stained with silver nitrate solution[5]. The significance of difference, as compared to the control was determined[6] by student's *t* test.

There is a significant ($P < 0.01$) increase in the number of corpuscles in the proglottids of worms grown in media containing bile as compared to those grown in the abscence of bile. The number of corpuscles gradually increased in the proglottids in the medium containing upto 0.12% of ox bile. However,