Calcutta; the Division of Entomology, Indian Agricultural Research Institute, New Delhi; the Systematic Entomology Laboratory, United States Department of Agriculture, Washington; and the British Museum (Natural History), London.

So far 28 species are known under this genus[2]. The new species *A. philomenae* is allied to *A. dispersus* Russell[3] in the shape of pupal case and vasiform orifice and lingula exposed with 4 hairs at its tip but differs from it in the number of subdorsal compound pores and absence of different shaped pores.

The species has been named after Dr (Miss) P. A. Philomena, who drew my attention to this species of whitefly.

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SEMEN ADDITIVES, FREEZABILITY AND FERTILITY IN CROSSBRED BULLS

P. M. BELORKAR, A. J. DHAMI, B. S. BHADASHIYA, J. M. VYAS and S. B. KODAGALI

Department of Gynaecology and Obstetrics, Gujarat Veterinary College, Gujarat Agricultural University, Anand 388 001, India.

RECENTLY, enzymes, hormones, tranquilizers and vitamins have been studied for incorporation in the semen diluents to enhance the fertility of semen used for artificial insemination. Kurzrok *et al*[1] reported infertility due to insufficient enzymes associated with low sperm concentration in human which could be successfully treated by the addition of 10–20 μg hyaluronidase in semen. According to Austin[2] hyaluronidase permits sperms to disperse and penetrate the cumulus oophorus facilitating fertilization.

In the present study, 24 ejaculates with initial motility above 70% were obtained from 4 crossbred bulls (K × J and K × HF) at weekly intervals to study the effect of semen additives on freezability and fertility. Three extenders viz., tris fructose yolk[3] (TFY), egg yolk citrate[4] (EYC), and lactose yolk[5] (LY) at 6% glycerol level were used. Three additives tried under split ejaculate technique in these extenders were histamine phosphate (BDH, 2.5, 5 and 10 mμ), acetylcholine chloride (BDH, 2.5, 5 and 10 μg) and hyalase (Rallis India, 100, 150 and 200 IU/ml of dilutor). The dilution rate was adjusted keeping 50–60 millions live sperms/ml before freezing and straw freezing was done in liquid nitrogen vapour after 5 hr of equilibration[6] at 5°C. Spermatozoal motility was assessed thrice, immediately after dilution, and then on equilibration and freezing. For fertility trials, the lowest level of each additives was used. A total of 696 and 496 inseminations were performed and followed under field conditions using semen frozen in three diluents with and without additives, respectively. The data were analysed statistically[7].

Spermatozoal motility was found to be significantly ($P < 0.01$) depressed at all the three levels of histamine and acetylcholine addition in each of the dilutors and bulls. However, hyalase did not show depressing effect on sperm motility after initial dilution, equilibration or freezing when compared with nonadditive control samples. The lowest concentration of each additives showed less depression in sperm motility. A comparison of post-thaw motility and fertility among histamine, hyalase and acetylcholine added and nonadded controls, and between dilutors with and without additives presented in table 1 shows that the addition of histamine showed significantly low post-thaw motility and fertility than the hyalase, acetylcholine or nonadditive control. The improvement in fertility was significant with the addition of hyalase and acetylcholine (48.17 and 51.96%) when compared with control (41.53%). Overall, additives depressed post-thaw motility from 52.80% to 42.91%, but improved fertility from 41.53% to 50.07%, the differences being significant. Additives in TFYG and LYG diluents significantly improved fertility as compared to nonadditive controls or in EYCG with or without additives.

Additives were found to improve fertility markedly in poor freezability group of bulls as compared to nonadditive control (46.05 vs 34.47%). But no significant difference was observed in fertility for added and nonadded control in bulls of good freezability group (52.03 vs 47.89%). Low sperm motility in acetylcholine and histamine added samples may be attributed to more effective membrane-

Table 1 *Semen additives, freezability and fertility in crossbred bulls*

Additives/ dilutors	No. of cows inseminated and followed	No. of cows found pregnant	Conception rate (%)	Post-thaw motility (%)
Histamine (2.5 mμ/ml)	37	13	35.13	36.00±3.28*
Hyalase (100 IU/ml)	328	158	48.17*	51.70±2.79
Acetylcholine (2.5 μg/ml)	331	173	51.96*	48.30±3.12*
Overall additives	696	344	50.07*	42.91±2.63*
Nonadditive Control	496	206	41.53	52.80±1.37
TFYG (a)	240	123	51.25	39.82±2.71*
(b)	144	52	36.11*	56.00±2.06
EYCG (a)	223	111	49.54	45.40±2.19*
(b)	170	85	50.00	56.16±1.83
LYG (a)	233	117	50.23	43.32±2.47*
(b)	182	69	37.91*	59.30±2.18

(a) With additives; (b) Without additives; * Significant at 5% level.

stabilizing properties of these additives, which however need further studies. The present results show that there was a definite advantage with the addition of hyalase and acetylcholine in semen diluents especially of poor freezability group of bulls.

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LOW TEMPERATURE INDUCED ABNORMALITIES IN SILKWORM *BOMBYX MORI*

J. NAGARAJU, RAVINDRA SINGH and V. PREMALATHA

Central Sericultural Research and Training Institute, Srirampura, Mysore 570 008, India.

It is well known that the manifestation of morphological characters in the silkworm undergoes striking changes under the influence of environmental factors[1,2]. Temperature, particularly during embryonic development, plays a vital role in determining the voltinism and moultinism behaviour of silkworm, *Bombyx mori*[3,4]. It has also been found that low temperature during embryonic development results in the induction of E-group alleles located on 6th chromosome which cause many developmental abnormalities in the silkworm[5]. The present study deals with the induction of some larval abnormalities by low temperature during embryonic development.