

## ROLE OF GLYCOGEN-GLUCOSE IN THE ACCESSORY REPRODUCTIVE GLAND AND SPERM TRANSFER IN *ASPONGOPUS JANUS* (FABR.)

L. S. RANGANATHAN, V. SRIRAMULU,  
D. BALASUNDARAM and G. SRIDHARAN

Department of Zoology, Annamalai University,  
Annamalainagar 608 002, India.

STUDIES on the energy metabolism in relation to male reproduction on insects are very few<sup>1</sup>. Though the male accessory gland (ACGL) in insects is known to serve in the elaboration of seminal plasm, formation of spermatophore, enhancement of oviposition rate, inducing monogamy and sterility, little is known about the gland's secretion in the energy metabolism of sperms during mating<sup>2,4</sup>. In *Plebeigryllus guttiventris*<sup>5</sup> which transfers sperms by spermatophore and *Chrysocoris purpureus*<sup>6</sup> which transfers sperms directly through seminal plasm, it has been found that the glycogen-glucose metabolism is more or less identical. Since the chemistry of insect glycogen has not been studied<sup>1</sup> and *Aspongopus janus* mates only once during the adulthood, unlike *P. guttiventris* and *C. purpureus* which mate frequently, an attempt is made here to study the glycogen-glucose metabolism in the male ACGL related to mating in *A. janus*.

The bugs are found during September to January on Cucurbitaceous plants. They were collected from fields around the campus and reared in the laboratory conditions of 12 hr light/12 hr dark, at  $29 \pm 1^\circ\text{C}$  and normal humidity. The ACGL is a median, very long and highly coiled duct, one on either side of the base of vasa deferentia. The ACGL was collected from the animal before and just after mating. The glycogen-glucose contents of the gland were estimated adopting the colorimetric micromethod of Kemp *et al*<sup>7</sup> and the results are given in table 1.

It is observed that in the sexually mature bug, the glycogen content in the ACGL, before mating is about 25% more than the glucose content. On the contrary, the glycogen-glucose ratio is reversed in the gland after mating. The glucose content has increased over that of

glycogen by 66.6%. It is further observed that the glucose content has increased just after mating by 60%. On the other hand the glycogen content of the gland has decreased by 37.5% after mating.

The seminal fluid is mostly elaborated by the ACGL and contains a high concentration of amino acids, proteins and carbohydrates<sup>8</sup>. Glycogen has been shown in the secretion of the ACGL in *P. guttiventris*<sup>5</sup> and *C. purpureus*<sup>6</sup>. It was found that the glycogen-glucose metabolism in the ACGL is more or less the same in the above insects though the mode of transfer of sperm is different. In the honey bee drones, it is found that there is a higher concentration of glucose, fructose and trehalose as well as fructolysis in the male reproductive organs<sup>9</sup>. It was observed that glycogen in the ACGLs of *P. guttiventris* and *C. purpureus* is converted to glucose and the energy released during the conversion is utilized for the transference of sperms carried in the seminal plasm elaborated by the ACGL<sup>5,6</sup>. Similarly it is observed in the present study on *Aspongopus janus* that the glycogen content of the ACGL after mating is reduced by 37.5% while the glucose content has increased by 60%, indicating the conversion of glycogen to glucose. *A. janus*, unlike *P. guttiventris* and *C. purpureus* where there are frequent matings, depends on the only mating that takes place in its adulthood for its sustenance and such crucial mating would require safe, perfect transfer of sperms in full virility and such vital energy demand for the sperms is met by the high content of glycogen and free glucose in the secretion of the ACGL, during mating, since it is known that glycogen is the chief reserve in insects and glucose has a central place in carbohydrate metabolism<sup>1,10,11</sup>.

The authors are grateful to the Professor of Zoology and the University authorities for facilities.

2 February 1984; Revised 14 March 1984

Table 1 Glycogen and glucose contents in the ACGL of *Aspongopus janus*

Sugar ( $\mu\text{g/gland}$ )	Before mating	After mating
Glycogen	$39.5 \pm 0.5$	$26.0 \pm 0.25$
Glucose	$30.5 \pm 1.4$	$74.0 \pm 0.19$

- Gilmour, D., *The metabolism of insects*, W. H. Freeman, San Francisco, 1965.
- Leopold, R. A., *Annu. Rev. Entomol.*, 1976, **21**, 199.
- Ranganathan, L. S., Ph.D. Thesis, Annamalai University, 1983.
- Davey, K. G., *Reproduction in the insects*, W. H. Freeman, San Francisco, 1965.
- Ranganathan, L. S., *J. Annamalai Univ. Sci.*, 1970, **28**, 111.
- Ranganathan, L. S., *Curr. Sci.*, 1973, **42**, 209.
- Kemp, A., Adrienne, J. M. and Kits van Heijningen., *Biochem. J.*, 1954, **56**, 646.

8. Jan de Wilde, *The physiology of insecta*. (ed.) M. Rockstein, Vol. I, Academic Press, New York, 1964, p. 1.
9. Blum, M. S., Glowska, Z. and S. Taber, *Annu. Ent. Soc. Am.*, 1950, 55, 135.
10. Wyatt, G. R., *Advances in insect physiology*, Vol. II, 287 (eds) J. E. Treherne, and V. B. Wigglesworth, Academic Press, New York.
11. Chefurka, W., *The physiology of insecta*. (ed.) M. Rockstein, Academic Press, New York, 1965, Vol. II, 581.

---

## ANNOUNCEMENTS

---

### ELECTRON MICROSCOPY AND ANALYSIS GROUP [EMAG] BIENNIAL CONFERENCE AND EUROPEAN SOLID STATE DEVICE RESEARCH CONFERENCE [ESSDERC]

The Electron Microscopy and Analysis Group of the Institute of Physics is arranging its biennial conference – EMAG '85 (with an associated exhibition) at the University of Newcastle upon Tyne, from 2–5 September 1985.

The Institute of Physics is arranging the 16th European Solid State Device Research Conference

(ESSDERC '86) at the University of Cambridge from 8–11 September 1986. The conference is organized under the auspices of the European Physical Society.

Further information may be had from: The Meetings Officer The Institute of Physics, 47 Belgrave Square, London SW1X 8QX.

---

### CONFERENCE ON SENSORS AND THEIR APPLICATIONS AND SIXTEENTH EUROPEAN SOLID STATE DEVICE RESEARCH CONFERENCE (ESSDERC)

The Institute of Physics, London, is arranging a second Conference on Sensors and their applications to be held at the University of Southampton, from 9–11 September 1985. There will be an Exhibition of Instruments and Apparatus in conjunction with the Conference.

The 16th European Solid State Device Research

Conference (ESSDERC) is being arranged by the Institute of Physics at the University of Cambridge, from 8–11 September 1986.

Further information on both conferences will be available from The Meetings Officer, The Institute of Physics, 47, Belgrave Square, London SW1X 8QX, UK.

---

### FIFTYFOURTH ANNUAL SESSION OF THE NATIONAL ACADEMY OF SCIENCES, INDIA

The Fiftyfourth Annual Session of the National Academy of Sciences, India, will be held at the Madurai Kamaraj University campus, Palkalainagar, Madurai during 11–13 October 1984.

During this Session, there will be a symposium and invited lectures besides oral presentation of research papers in the areas of Mathematics, Physics,

Chemistry and Biology.

Further details may be had from Professor S. Neelakantan, Convener, Organizing Committee & Local Secretary, Department of Natural Products Chemistry, Madurai Kamaraj University, Madurai 625 021.

---