



filled box under stereomicroscopic control. The samples were homogenized in 0.15 ml of cool 0.37 M trichloroacetic acid (TCA) and centrifuged for 15 min at  $12,000 \times g$ . The sediment was resuspended in 0.5 ml of 1 M NaOH and stored at  $4^{\circ}\text{C}$ , while the supernatant was immediately frozen and stored at  $-80^{\circ}\text{C}$ . Protein was assayed in 0.1 ml aliquots of resuspended sediment by means of the spectrophotometric method of Lowry et al.<sup>12</sup>. Cyclic AMP was determined in 0.03 ml aliquots of the supernatant by a competitive protein binding technique, using a cyclic AMP assay kit (The Radiochemical Center, Amersham). The theoretical curve fitting the experimental data was calculated by means of multiple regression analysis according to the Cosinor procedure<sup>13</sup>. Cosine functions may be fitted to a time series by different procedures. In this case, the amplitude and acrophase of the cosine function were estimated by linear regression techniques (least squares method) applied to the data after their transformation by sine and cosine functions. Data need not necessarily be equally-spaced over each cycle of the rhythm investigated. To test the null hypothesis F statistic was used according to the quoted procedure.

**Results.** The mean cyclic AMP concentration in the preoptic region was lower in the L period than in the D period. The analysis of mean hourly values showed that minimum L and maximum D levels were attained through continuous changes according to a sinusoidal function (table).

Hourly cyclic AMP fluctuations were also observed in the parietal cortex. However, the existence of a significant daily rhythm was not supported by statistical analysis (table). Such a result may depend on the averaging of small out-of-phase fluctuations of cyclic AMP in single animals. The difference with respect to the preoptic region is noteworthy even in this case.

The results show the existence of a daily rhythm of cyclic AMP concentration in the preoptic region. However, the small amplitude of such a rhythm does not warrant at present any inference on its functional significance. Nevertheless, in view of cyclic AMP involvement in central synaptic events<sup>14</sup>, the preoptic daily rhythm may be considered as the result of fluctuations in the activity of hypothalamic and brain stem neurotransmitters influencing the nucleotide's synthesis<sup>15,16</sup>. Experimental findings in the cat<sup>17</sup>, mouse<sup>18</sup>, and rat<sup>19,20</sup>, support this hypothesis.

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# Protein level in the haemolymph of the wasp *Polistes gallicus* L. at the beginning of imaginal life and during overwintering. Action of the strepsiterian parasite *Xenos vesparum* Rossi

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**Summary.** During the imaginal life of male *Polistes* wasps, the protein concentration in the haemolymph remained constant. In females, there were 2 groups; one in which this concentration was also stable and another in which it increased. No difference was detected between the haemolymphatic protein level of stylopedized males and normal ones. All parasitized females exhibited low haemolymph protein levels similar to those of the low level group.

The physiology of *Polistes* wasps is greatly affected by the presence of the parasite *Xenos vesparum* Rossi (Strepsiptera). One of the most drastic effects of this stylopedization is parasitic castration resulting in the suppression of normal ovarian development in adult females. Modifications occur both in the corpora allata and the neurosecretory cells of the pars intercerebralis<sup>1-6</sup>.

Previous works indicate that a large increase in the size of the *Xenos* larvae takes place during the first 15 days of the imaginal life of parasitized wasps. At this time, the endo-

parasitic larvae feed on the host haemolymph without causing any tissue damage<sup>6,7</sup>. Several authors have pointed out that in some insects, parasitic castration is accompanied by a depletion of haemolymphatic protein<sup>8-11</sup>. Thus it seemed of interest to study the variations of haemolymph protein levels during the imaginal life of the wasp *Polistes gallicus*.

**Material and methods.** The wasps were reared in the laboratory under standard conditions<sup>5</sup>. For studies carried out