

# Longevity of Adults of *Peckia chrysostoma* and *Adiscochaeta ingens* (Diptera: Sarcophagidae) Reared with and without Protein

Marisa Vianna Ferraz

Departamento de Entomologia, Instituto Oswaldo Cruz, Av. Brasil 4365, 21045-900 Rio de Janeiro, RJ, Brasil

*With access to a proteic source in the diet the mean longevity and lethal time (MLT) of Peckia chrysostoma was  $52.6 \pm 5.5$  and  $30.3 \pm 5.9$  days, respectively. With an isolated protein source, the mean longevity was  $49.1 \pm 2.6$  days and the MLT was  $28.5 \pm 0.8$  days. Without a proteic source the mean longevity and the MLT lowered to  $37.4 \pm 4.0$  and  $18.1 \pm 1.3$  days, respectively.*

*For Adiscochaeta ingens the mean longevity with access to a proteic source in the diet was  $29.0 \pm 6.0$  days and the MLT was  $16.7 \pm 2.7$  days. The figures with an isolated proteic source were  $26.9 \pm 4.8$  and  $14.9 \pm 2.0$  days, and without a proteic source were  $24.7 \pm 4.2$  and  $13.3 \pm 1.4$  days, respectively.*

*These results show that in P. chrysostoma the longevity is higher than in A. ingens and that the access to the proteic source increase the longevity in both species.*

Key words: longevity - protein lack - *Peckia chrysostoma* - *Adiscochaeta ingens* - Diptera - Sarcophagidae

This study is part of a series (Ferraz 1992 a, b, 1993), carried out at the laboratory, on the comparative biology of *Peckia chrysostoma* (Wiedemann 1830) and *Adiscochaeta ingens* (Walker 1849), two caliptratae muscoids. Results shown here pertain to alterations on the longevity of adults reared with and without access to a source of protein in the diet of one autochthonous species, *P. chrysostoma*, and an introduced one, *A. ingens*.

*Peckia chrysostoma*, a neotropic and sinantropic species, is widely spread and frequently found in high densities in Rio de Janeiro (d'Almeida 1984, Tavares et al. 1988, Ferraz 1992a, b). *A. ingens*, originally from the Brazilian "campos cerrados" (CC), has been found in Rio de Janeiro but in numbers of minor significance (Lopes 1973, 1974, Linhares 1981, Lopes & Tibana 1982, d'Almeida 1984, Dias et al. 1984).

## MATERIALS AND METHODS

The methodology adopted for the field collection, colonization and rearing of adults has been previously described (Ferraz 1993). For each species, two groups of 25 recently-emerged couples were kept in cages with water, glicose and a proteic source. The number and sex of dead individuals was observed daily in order to elaborate the longevity curve. Comparisons were made with groups of the same number maintained without the proteic source and with the proteic

source isolated with a piece of tulle, to determine the influence of protein on longevity of adults. The capacity of surviving was measured according to Crystal (1967), as follows: (a) *mean lethal time*: period of time in which half population will have died; (b) *longevity mean*: quotient of sum of individuals' longevities by the number of individuals.

These experiments were carried out at room temperature with mean temperature of  $27.7^\circ\text{C}$  (from  $24^\circ\text{C}$  to  $32^\circ\text{C}$ ) and mean relative humidity of 71.5% (56.0% - 86.0%).

## RESULTS

Means of the longevities and mean lethal time (MLT) are displayed on Tables I and II. For both species, on the three studied conditions, females had higher longevity than males. The isolated protein had some influence on the increase of

TABLE I

Longevities, in days, of females and males of *Peckia chrysostoma* according to the type of food (P: with free access to protein source; I: with isolated protein source; N: without protein source)

	Longevity	Mean	MLT	Mean
P. female	$58.1 \pm 26.9$	$52.6 \pm 5.5$	$36.2 \pm 17.1$	$30.3 \pm 5.9$
male	$47.1 \pm 27.0$		$24.4 \pm 12.9$	
I. female	$51.7 \pm 27.7$	$49.1 \pm 2.6$	$27.7 \pm 10.9$	$28.5 \pm 0.8$
male	$46.4 \pm 21.0$		$29.3 \pm 11.5$	
N. female	$41.4 \pm 25.7$	$37.4 \pm 4.0$	$19.4 \pm 9.5$	$18.1 \pm 1.3$
male	$33.4 \pm 20.6$		$16.8 \pm 5.9$	

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longevity while the access to proteic source provided the highest longevity.

Fig. 1 shows the comparison of longevity means between the two species. The obtained longevity curves in the three different experiments are displayed on Fig. 2.

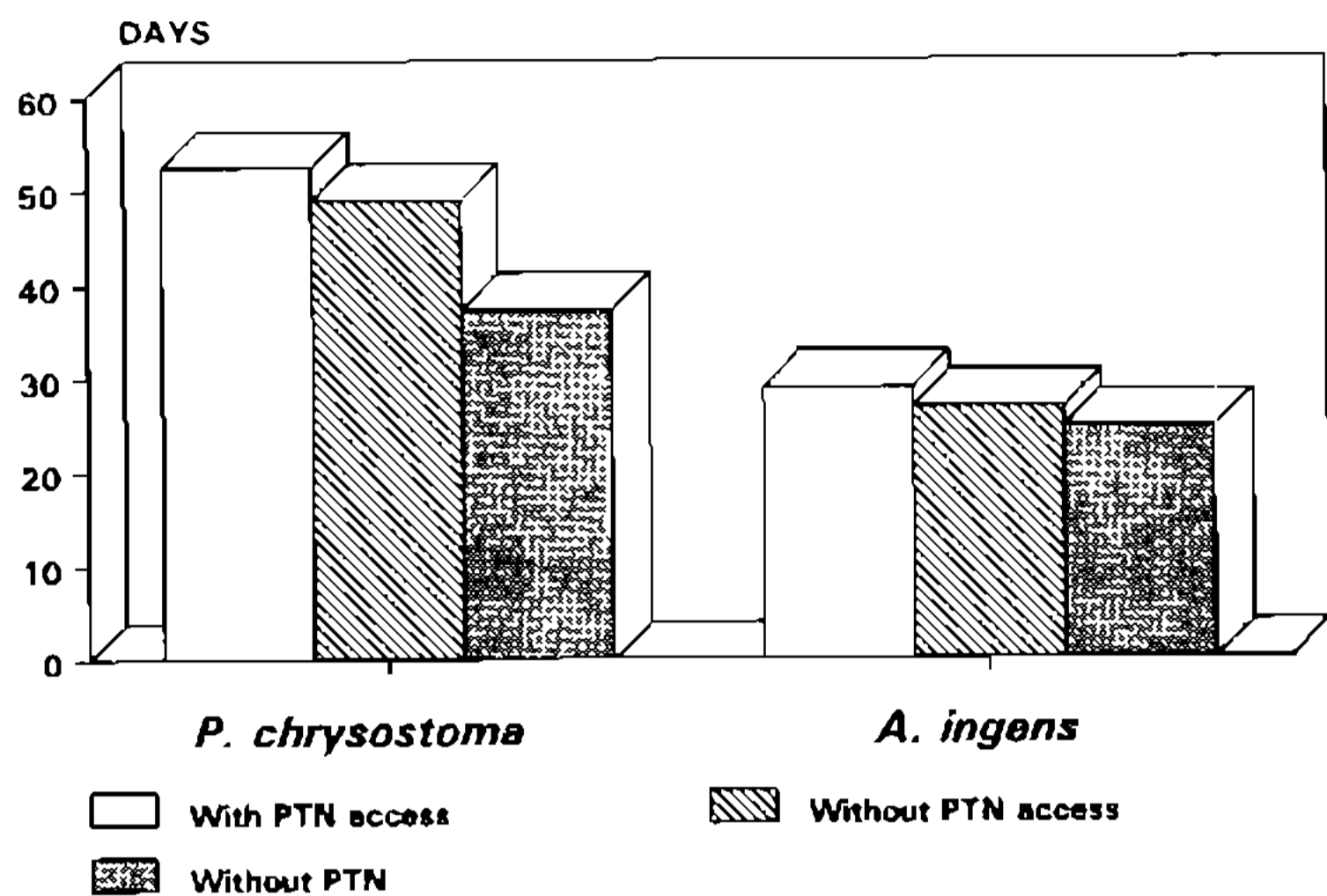


Fig. 1: comparison of mean longevity between *Peckia chrysostoma* and *Adisochaeta ingens* according to the type of food.

TABLE II

Longevitys, in days, of females and males of *Adisochaeta ingens* according to the type of food (P: with free access to protein source; I: with isolated protein source; N: without protein source)

	Longevity	Mean	MLT	Mean
P. female/male	35.1 ± 19.1 23.0 ± 11.1	29.0 ± 6.0	19.4 ± 10.9 14.0 ± 6.3	16.7 ± 2.7
I. female/male	31.8 ± 19.2 22.1 ± 11.9	26.9 ± 4.8	17.0 ± 11.0 12.9 ± 9.5	14.9 ± 2.0
N. female/male	29.0 ± 18.6 20.5 ± 10.8	37.4 ± 4.2	14.7 ± 10.6 11.9 ± 7.2	13.3 ± 1.4

## DISCUSSION

It is known that survival of flies requires a previous source of carbohydrate (Strangways-Dixon 1961, Peterson et al. 1987). Several authors have already observed that the survival from egg to pupa, the emergence of the adults and the longevity are significantly altered with changes in the composition of the diet (Mackerras 1933, Strangways-Dixon 1961, Du Toit 1975, Fain et al. 1985, Spates & DeLoach 1985, Taylor 1988, Linhares & Avancini 1989, Schmidt & Harris 1989). Mello and Garcia (1983), however, have not observed significant difference of the mortality of *Stomoxys calcitrans* females using different diets.

In previous studies with females isolated with two males, Ferraz (1992 a, b) observed that longevity was higher with no access (81 days for *P. chrysostoma* and 52 for *A. ingens*) than with access to protein source (59 days for *P. chrysostoma* and 41 for *A. ingens*). These data agree with those of Fraenkel (1940) who stated that many species of flies may survive alive and be healthy with a diet of sugar and water. In this way they are able to live their maximum lifespan. The addition of protein in the diet is essential only for the eggs' development and it does not occur an increase in longevity, existing even evidence that this could have an opposite effect. The results obtained here, however, are totally opposite: in both species, the higher longevity occurred when there was access to protein.

In the experiments performed with isolated protein source, *A. ingens* was frequently seen sucking the haemolymph of the individuals that had died the day before, probably to compensate the lack of protein source. This behavior was not observed in the experiments performed without protein. The presence of a stimulus of oviposition caused by the release of bacterial odours (Emmens & Murray 1982) by the isolated protein source may have contributed to this fact.

Kamal (1958) observed that constant and controlled temperatures speeded the life cycle and shortened the lifespan of many calliphorid and sarcophagid adults compared to what was observed in variable temperature conditions. The maximum lifespan of *Sarcophaga cooleyi*, *S. shermani* and *S. bullata* with protein source it was of 34, 31 and 30 days, respectively. Without protein source it was 21, 21 and 22 days, respectively, i.e., the longevity was higher in individuals maintained with access to the protein source as we observed in the present study. This author also observed that the size of the cages influenced the longevity: the largest one increased the lifespan.

In all experiments, with both species, the longevity of females was higher than that of males. Mackerras, in 1933, had already observed that females of many flies can live longer than males.

Longevity of adult flies varies a lot according to many environmental factors, but also according to the species. Glaser (1923), for instance, observed a mean lifespan of 20 days for *Musca domestica* and *Stomoxys calcitrans*. Mackerras (1933) observed that *Lucilia* species lived up to 94 days. Peterson et al. (1983) observed that *Cochliomyia hominivorax* males lived for 25 days. Karunamoorthy and Lalitha (1986) observed that at  $32 \pm 2^\circ\text{C}$ , longevity of *L. cuprina* males and females was 23 and 31 days, respectively. Finally, Vogt (1987) observed that *Musca vetustissima* females had a mean lifespan of 140 days.

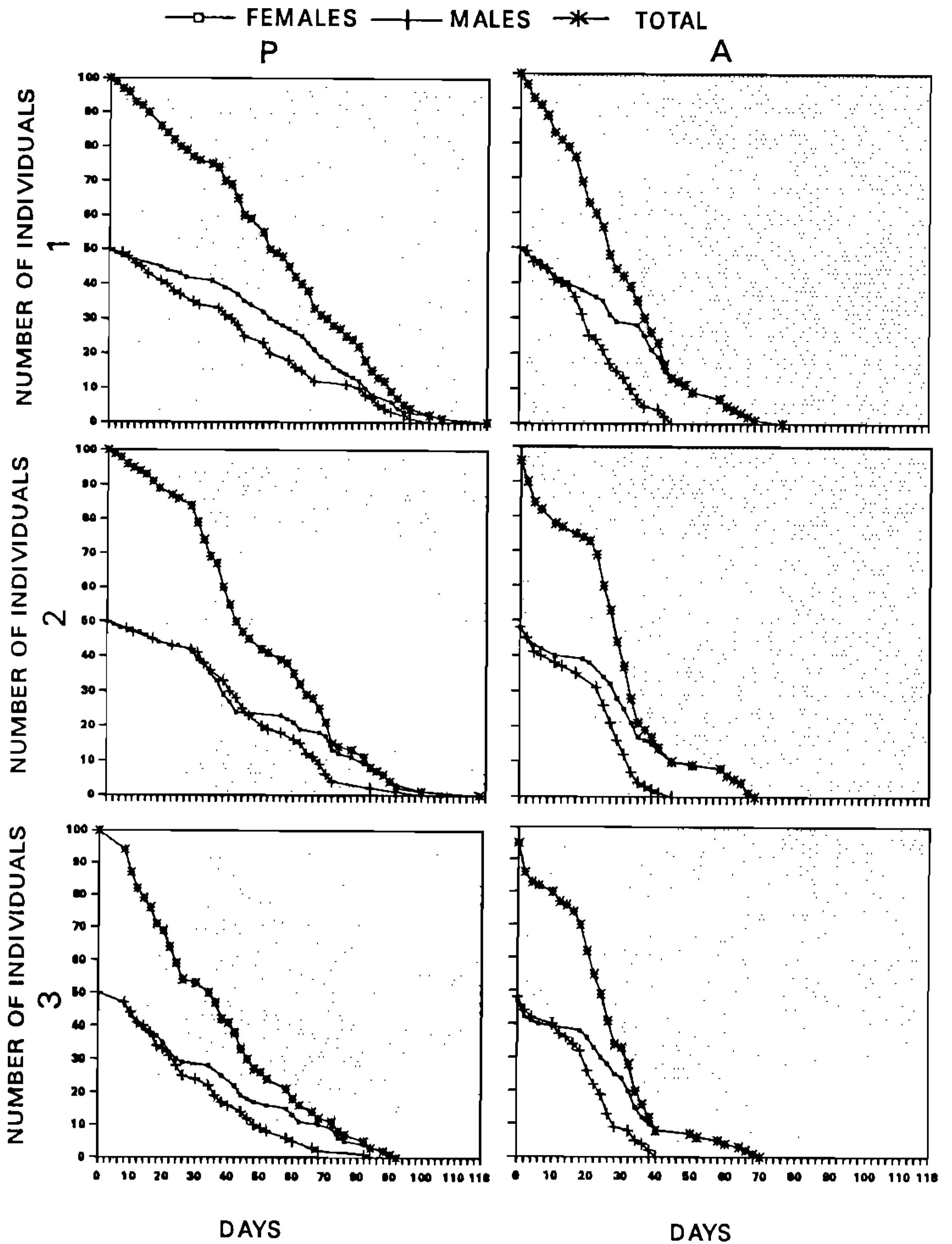


Fig. 2: longevity of *Peckia chrysostoma* (P) and *Adiscochaeta ingens* (A) adults reared with access to the protein source (1), with isolated protein source (2) and without protein source (3), at room temperature.

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