

Deposition, Incubation Period and Hatching of Eggs from *Triatoma juazeirens* Costa & Felix and *Triatoma sherlocki* Papa, Jurberg, Carcavallo, Cerqueira & Barata (Hemiptera: Reduviidae) under Laboratory Conditions

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EntomoBrasilis 5 (2): 130-136 (2012)

Abstract. *Triatoma juazeirens* Costa & Felix and *Triatoma sherlocki* Papa, Jurberg, Carcavallo, Cerqueira & Barata are members of the *Triatoma brasiliensis* Neiva, 1911 species complex. Discovered in the state of Bahia, Brazil, collections from both natural and artificial habitats revealed that they can be found infected by *Trypanosoma cruzi* (Chagas) suggesting a potential to be vectors for Chagas disease. To contribute to the evaluation of this potential, the capacity of each species to proliferate under laboratory conditions was measured by the number of eggs laid, the rate of hatching and the incubation time over a 22-week period. Thirty pairs, fifteen of each species, were maintained under laboratory conditions by weekly feedings on mice, *Mus musculus* (Linnaeus). The comparisons of laid and hatched eggs of *T. juazeirens* and *T. sherlocki* were analyzed by *t*-test and Mann-Whitney test. When *p* value of <0.01 it was considered statistically significant. For comparison of the average longevity, a chi-square analysis was used. When *p* > 0.01, the average longevity was not considered statistically different. The two species presented similar incubation periods for their eggs, but *T. juazeirens* demonstrated greater reproductive potential than *T. sherlocki*. The females of *T. sherlocki* deposited significantly fewer eggs with a lower rate of viability. Results suggest that *T. juazeirens* is a more serious threat, concerning to these reproductive features. Considering the longevity, no significant differences could be noticed.

Keywords: Reproduction; Triatominae; *Triatoma brasiliensis* complex.

Oviposição, Período de Incubação e Eclosão dos Ovos de *Triatoma juazeirens* Costa & Felix e *Triatoma sherlocki* Papa, Jurberg, Carcavallo, Cerqueira & Barata (Hemiptera: Reduviidae) em Condições de Laboratório

Resumo. *Triatoma juazeirens* Costa & Felix e *Triatoma sherlocki* Papa, Jurberg, Carcavallo, Cerqueira & Barata são membros do complexo de espécies *Triatoma brasiliensis* Neiva, 1911. Descobertas no estado da Bahia, Brasil, coletas em ambos os habitats natural e artificial revelaram que essas espécies são encontradas naturalmente infectadas por *Trypanosoma cruzi* (Chagas) sugerindo que ambos os vetores estão, provavelmente, associados à transmissão da doença de Chagas na região. Com o objetivo de contribuir para avaliação da capacidade vetorial das duas espécies, parâmetros biológicos como: fecundidade, fertilidade, período de incubação dos ovos e longevidade das fêmeas foram analisados comparativamente. Trinta casais individualizados, 15 de *T. juazeirens* e 15 de *T. sherlocki*, foram alimentados em camundongos *Mus musculus* (Linnaeus) semanalmente e mantidos sob condições ambientais. Os ovos foram coletados e individualizados em frascos separados por data de postura até a eclosão das ninfas. A comparação das médias da oviposição e da eclosão de *T. juazeirens* e *T. sherlocki* foi realizada pelo teste *T* seguida do teste de Mann-Whitney, quando *p*<0,01 a diferença foi considerada estatisticamente significativa. Para comparação das médias de longevidade aplicou-se o teste Qui-quadrado, quando *p*>0,01 as médias de longevidade não foram consideradas estatisticamente diferentes. As duas espécies apresentaram períodos similares de incubação dos ovos, entretanto, *T. juazeirens* demonstrou maior potencial reprodutivo, com fecundidade e fertilidade superiores a *T. sherlocki*, em condições de laboratório. Quanto à longevidade, as fêmeas de *T. sherlocki* e *T. juazeirens* não apresentaram diferenças significativas.

Palavras-Chave: Complexo *Triatoma brasiliensis*; Reprodução; Triatominae.

American trypanosomiasis is one of the most widely distributed diseases in the Americas, caused by the parasite *Trypanosoma cruzi* (Chagas) (Kinetoplastida: Trypanosomatidae), the etiological agent (VINHAES & DIAS 2000). The underlying cause of the infection is the natural transmission of *T. cruzi* through members of a subfamily of blood-sucking insects, Triatominae (Hemiptera, Reduviidae). An estimated eight million people are currently infected and another 28 million people are at risk (WHO/CTD 2009). It is expanding into a global

issue with its appearance on other continents through human activities (COURA & VIÑAS 2010).

Actually 143 individual insect species were described, ranging from the southern United States to southern Argentina (POINAR 2005; SCHOFIELD & GALVÃO 2009; GURGEL-GONÇALVES *et al.* 2012) In Brazil, a great campaign to control the *Triatoma infestans* (Klug) the vector responsible for most of cases of *T. cruzi* infection in South America, caused the reduction of its populations and now

other vectors are replacing it (DIOTAIUTI *et al.* 1995; ALMEIDA *et al.* 2000; SILVEIRA 2011). Currently, the *Triatoma brasiliensis* Neiva is considered one of the most important vector in semi-arid northeastern region of Brazil (COSTA *et al.* 2003a).

Recently, multidisciplinary studies suggest that of *T. brasiliensis* represent a complex species compounded by four members: *Triatoma brasiliensis brasiliensis* Neiva, *Triatoma brasiliensis macromelasoma* Galvão, *Triatoma melanica* Neiva & Lent, *Triatoma juazeirensis* Costa & Felix. In these studies, were analyzed the following data concerning four populations: 1 - morphological, demonstrating differences in the ornamentation on the exochorion of the eggs (COSTA *et al.* 1997a), 2 - isoenzymatic, where the analysis of nine loci by multilocus enzyme electroforesis showed significant genetic distances (COSTA *et al.* 1997b), 3 - ecological, proving by ecological niche modeling that the staining patterns are stable and not influenced by the different environments in which the populations are distributed (COSTA *et al.* 2002) 4 - biological, detecting low reproductive compatibility in crossing experiments (COSTA *et al.* 2003b), 5 - genetic, by analyzing the mtDNA fragments of Cyt B, it was possible to detect genetic differentiation (MONTEIRO *et al.* 2004). Later, MENDONÇA *et al.* (2009) by carrying out the sequencing of the mtDNA fragments of Cyt B and 16S ribosomal RNA it was possible to place the *Triatoma sherlocki* Papa, Jurberg, Carcavallo, Cerqueira & Barata in *T. brasiliensis* complex.

Wild triatomines are possibly in a process of adaptation to the domestic environments, such as *T. sherlocki* with index of domicile density (0.36) comparable to other species considered domiciliated (ALMEIDA *et al.* 2009). In the domicile, nymphs and adults were found in fissures in the walls of houses (built of mud, rocks, wood) and under the bed. In this inspection, it was observed a high diversity of predators, especially spiders, such as *Bothriurus asper* Pocock which may be responsible for the low density of bugs found (ALMEIDA *et al.* 2009). *T. sherlocki* has only been collected from the wild ecotope in community of Gentio do Ouro, Bahia State, presenting considerable densities of colonies captured (0:31 researcher / hour - Encantado; 1:50 researcher / hour - Santo Inácio) with 10.9% of natural infection by *T. cruzi* (ALMEIDA *et al.* 2009). In the natural environment, is found in rock formations (~ 596 m above sea level) devoid of vegetation. In this ecotope, *T. sherlocki* develop colonies in the crevices between the rocks, being found under rocks fragments or on their surface when they come out to feed themselves at night (ALMEIDA *et al.* 2009). In their micro-habitat, this triatomine divides his shelter with rodents [*Kerodon rupestris* (Wied-Neuwied)] animals very common in this environment (CERQUEIRA 1982) (unpublished data).

T. juazeirensis displayed a wider distribution within the state of Bahia in the natural and artificial ecotopes (COSTA *et al.* 1998, 2003a). The analysis of data collected of triatomines in domiciliary units, recorded by FUNASA in the period of 1993-1999 showed that *T. juazeirensis* colonizes primarily the peridomicile (colonization index = 36.9 - dwellings; 44.9 - peridomicile) (COSTA *et al.* 2003a). In the peridomicile, these triatomines are found under rocks, in wood fences around stables or animals and bundles of dry wood, which they feed themselves on animals present in this environment as goats, dogs and birds (COSTA *et al.* 1998). In the town of Curaçá, Bahia State, domestic specimens were discovered colonizing wood and not rocky (as in wild habitat) suggesting a behavioral plasticity towards habitats (CARBAJAL DE la FUENTE *et al.* 2008). In wilderness, *T. juazeirensis* is found in different sites of the rock formations such as crevices between rocks, under rocks and over the rocks. The examination of the food source of wild triatomines showed that they may feed on opossum, armadillo and rodents (COSTA *et al.* 1998). *Triatoma sherlocki* and *T. juazeirensis* are phylogenetically related species found in the same ecotope (rock piles), and occur around 44 km far apart from each other in the state of Bahia, Brazil (MENDONÇA *et al.* 2009; ALMEIDA *et al.* 2011).

Thus, determination of different biological parameters for triatomines is important for the analysis of their capacity as vectors for *T. cruzi* infections. These parameters include the oviparity, fertility, longevity, feeding patterns and defecation patterns (BRASILEIRO 1984; COSTA *et al.* 1986; LIMA *et al.* 1987; DAFLON-TEIXEIRA *et al.* 2009). Considering that both species infest human dwellings in the state of Bahia, the evaluation of vectorial capacity is important for future planning of actions to control infestations and studying the epidemiology of Chagas disease. The present work describe a comparison of the egg-laying potential, fertility rate, egg incubation period and female longevity for *T. sherlocki* and *T. juazeirensis* under laboratory conditions. Additionally, these data provide insights to their capacity to be vectors.

MATERIAL AND METHODS

Origin of triatomines. *T. juazeirensis* and *T. sherlocki* used in the experiments were from colonies maintained in the “Laboratório de Biodiversidade Entomológica” of “ Instituto Oswaldo Cruz-FIOCRUZ”, at a rate 27°C and 75.5% relative humidity. The founders of the insect colonies were collected at the following locations in the state of Bahia: a total of 22 specimens of *T. sherlocki* (5 females, 2 males and 15 nymphs) were collected in the municipality of Gentio do Ouro, at the localities of Encantado (11° 13' 20" S, 42° 46' 37" W) and 53 specimens (7 females, 9 males and 37 nymphs) at the locality of Santo Inácio (11° 06' 46" S, 42° 43' 06" W). A total of 10 specimens of *T. juazeirensis* (2 females, 1 male and 7 nymphs) were collected in the municipality of Itaguaçu, locality of Toca do Cosme, (11° 00' 43" S 42° 23' 56" W) and 34 specimens (9 females, 18 males and 7 nymphs) originated Gameleira, in the municipality of Central (11° 08' 09" S 42° 06' 46" W).

Preparation of triatomines pairs. Fifth-instar nymphs from the insect colony were randomly selected by sex and segregated into different plastic bottles (4x4x9 cm). Feeding was performed every two weeks on mice *Mus musculus* (Linnaeus) until imaginal ecdysis (procedure approved by CEUA – “Comitê de Ética no Uso de Animais da Fundação Oswaldo Cruz”, license L-0064/08). After the emergence of adults, 15 pairs each of *T. juazeirensis* and *T. sherlocki* were transferred to plastic becker (3cm diameter and 8cm height).

Triatomines feeding, oviposition and hatched. The insects were fed on mice (*M. musculus*) weekly and maintained in identical conditions. The containers were observed once a week for the presence of eggs. The eggs were collected and separate by date and the incubation period was determined from the date of collection until hatching. In addition, the observation period of oviposition and hatched was in total 22 weeks. The 22 weeks period of observation was correlated with a decrease in the observed fertility and fecundity of both species. Overall, for each experimental insect pair, the following data were recorded weekly: the number of eggs laid, the number of hatched eggs (fertility), the incubation period (time to hatching of eggs) and longevity. The viable and not viable eggs were checked at least for 42 days, before discarding. The comparisons of laid and hatched eggs of *T. juazeirensis* and *T. sherlocki* were analyzed by *t*-test and Mann-Whitney test. When *p* value of <0.01 it was considered statistically significant. For comparison of the average longevity, a chi-square analysis was used. When *p* > 0.01, the average longevity was considered statistically not different.

RESULTS

The observation period started when the adults emerged from the imaginal ecdysis and continued for a period of 154 days (22 weeks), which correlated with decreasing of observed laid egg. Therefore, data concerning the reproductive potential of each species based on egg and offspring production were derived from this observation period.

The combined number of eggs collected from all *T. juazeirensis* breeder pairs was 2.055, ranging from 2 to 29 eggs with an average of 93 eggs per female (Table 1).

From *T. sherlocki* breeder pairs, a total of 734 eggs, ranging from 1 to 20 eggs on each occasion, exhibiting an average of 33 per female. From the plot in Figure 1 of the eggs collected each week, three observations are most notable. First, *T. juazeirensis* was capable of laying eggs within the first week after emergence, but the first eggs from *T. sherlocki* were only observed in the third week. Second, the capacity to lay eggs continued to increase over the next 5 weeks for *T. juazeirensis* and 7 weeks for *T. sherlocki*. Following this increase, the laying of eggs oscillated in number during the next 12 weeks (weeks 6-19) before a notable decreasing in the egg laying by week 20. The greatest average number of eggs laid by *T. juazeirensis* females was 12.5 in the 8th and 11th week. This was more than twice the greatest rate observed for *T. sherlocki* of 5.8 in the 12th week (Figure 1). The difference in egg-laying behavior between the two species was statistically different by the t-test ($t = 4.6, p < 0.01$) and a non-parametric test, the Mann Whitney Test ($p < 0.01$).

All fifteen females of *T. juazeirensis* were observed to lay eggs and fourteen produced eggs that hatched. In comparison, thirteen females of *T. sherlocki* laid eggs and only nine produced offspring. From the eggs laid by the fourteen *T. juazeirensis* that produced offspring, 93.7% hatched (Table 1). Of the eggs from the nine *T. sherlocki*, that produced offspring, 60.9% were

recorded to hatch. The pattern of egg hatching closely matched the pattern observed for egg laying (Figures 1 and 2) for both species. According to the statistical tests applied, the number of hatched eggs is significantly higher in *T. juazeirensis* than of *T. sherlocki* ($t = 5.5, p < 0.01$) and Mann Whitney ($p < 0.01$).

The incubation time of eggs of *T. juazeirensis* and *T. sherlocki* ranged from 14 to 28 days (mean 20.2 days), the eggs were observed at least 42 days before discarding. Most eggs considered nonviable presented with a clear color and were twisted, not with a pink tint or the eye spots characteristic of fertile eggs. Some eggs were dark brown, but were completely dry. The ratio of viable to non-viable eggs varied over the observation period. *T. juazeirensis* females had a small peak of non-viable eggs early in weeks 2 and 3, but consistently laid primarily non-viable eggs until weeks 12 and 13 (Figure 3). This was in contrast to *T. sherlocki* females, which consistently laid more non-viable eggs (Figure 4).

Throughout the study, 80% (12) of the *T. juazeirensis* females and 46.6% (7) of the *T. sherlocki* females died. The average survival period was 113.7 days (16.24 weeks) (min = 62, max = 154) for *T. juazeirensis* and 114.8 (16.40 weeks) (min = 90, max = 154) for *T. sherlocki* (Table 2). While the number of deaths recorded for *T. juazeirensis* females was greater, the pattern of survival closely matched that of *T. sherlocki* females. The Chi-square test revealed that the averages were not statistically different ($\chi^2: 3.11, p > 0.01$).

Table 1. Egg-laying performed and hatching from eggs laid by 15 pairs *Triatoma juazeirensis* (Tj) and 15 pairs *Triatoma sherlocki* (Ts) over the period of 22 weeks.

Eggs Collected			Range	
Total	Average	Std Dev	Min	Max
Tj 2055	93.5	55.7	2	29
Ts 734	33.3	24.8	1	20

Hatched			Range		% Hatched
Total	Average	Std Dev	Min	Max	
Tj 1927	87.5	± 55.2	0	28	93.7
Ts 447	20.3	± 15.8	0	20	60.9

The difference in egg-laying behavior between the two species was statistically different by the t-test ($t = 4.6, p < 0.01$) and a non-parametric test, the Mann Whitney Test ($p < 0.01$). According to the statistical tests applied, the number of hatched eggs is significantly higher in *T. juazeirensis* than of *T. sherlocki* ($t = 5.5, p < 0.01$) and Mann Whitney ($p < 0.01$).

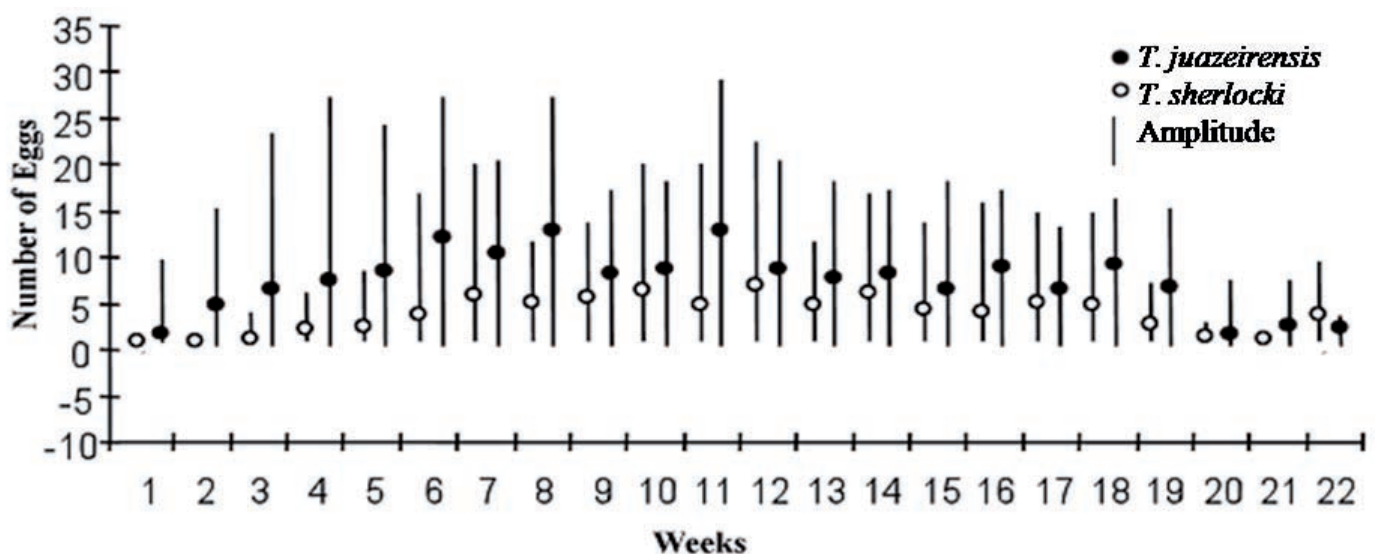


Figure 1. Average weekly deposition of eggs per female of *Triatoma juazeirensis* and *Triatoma sherlocki* over 22 weeks.

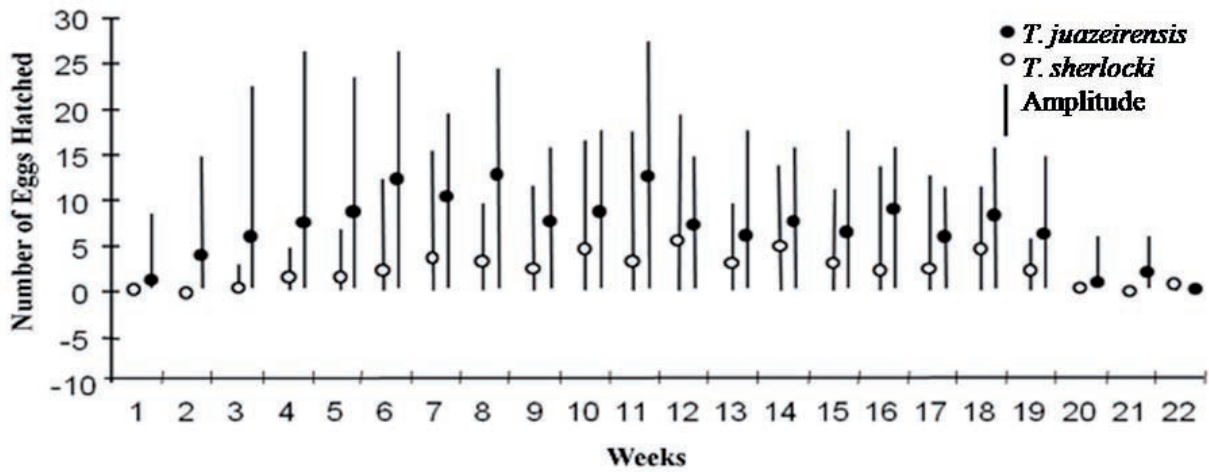


Figure 2. Weekly average of eggs hatched per female of *Triatoma juazeirensis* and *Triatoma sherlocki* from the 22 weeks period.

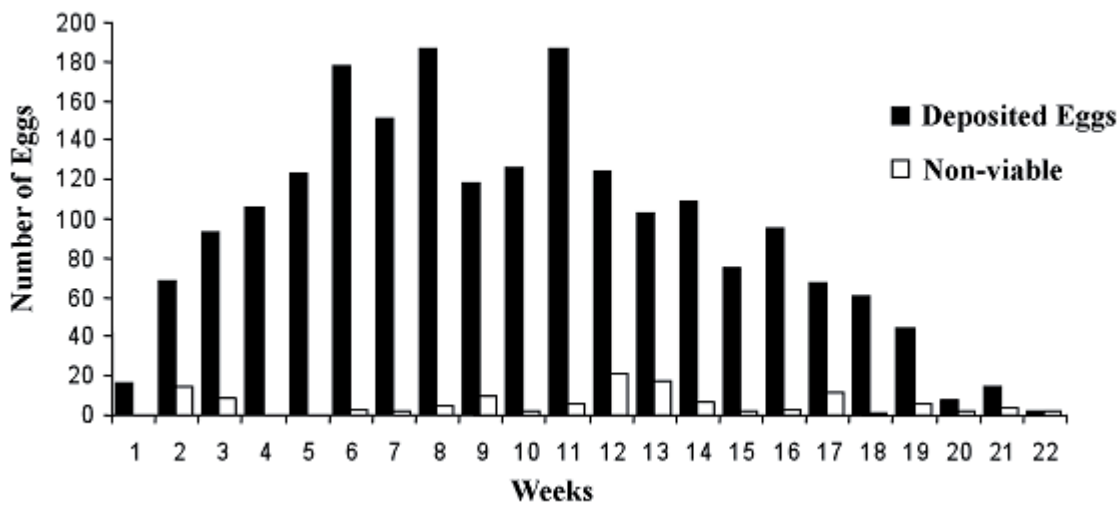


Figure 3. Viability of eggs deposited by *Triatoma juazeirensis* during the period of 22 weeks.

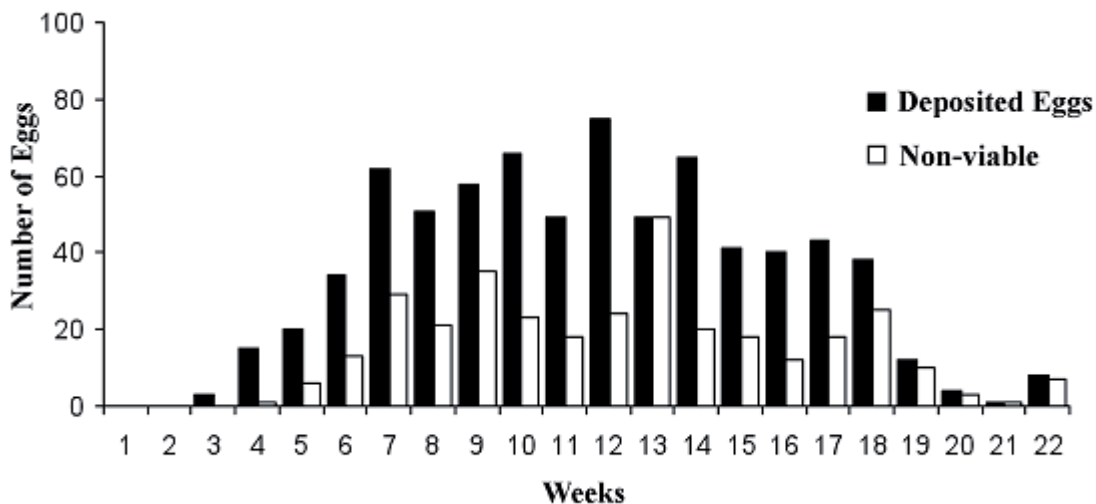


Figure 4. Viability of eggs deposited by *Triatoma sherlocki* during the period of 22 weeks.

Table 2. Longevity of females of *Triatoma juazeirensis* and *Triatoma sherlocki*, in days, from the 22 week period.

Species	Total Deceased	Average	Std Dev	Earliest	Latest
<i>T. juazeirensis</i>	12	113.7	± 24.4	62	154
<i>T. sherlocki</i>	7	114.8	± 24.9	90	154

Statistical Chi-square test (χ^2 : 3.11, $p > 0.01$) the average longevity was not considered statistically different.

DISCUSSION

In Brazil, campaign to control the *T. infestans* caused the reduction of its populations and now other vectors are replacing it (DIOTALUTI *et al.* 1995; ALMEIDA *et al.* 2000; SILVEIRA 2011). On the other hand, the general trend of vectors of Chagas disease to adapt to human dwellings and peridomiciliary structures is not necessarily associated with the colonization of a previous domestic specie. According RAMSEY & SCHOFIELD (2003) the triatomines colonize houses seeking stable climates and access to food sources. *Microtriatoma trinidadensis* (Lent) and *Belminus herreri* Lent & Wygodzinsky were found in houses in Bolivia and Colombia, respectively, which had not previously been colonized by domestic triatomines (DE LA RIVA *et al.* de 2001; SANDOVAL *et al.* 2004). Studies by SANDOVAL *et al.* 2004 showed that *B. herreri* is attracted to the home in seek of food, where is found abundant invertebrate hosts in the form of cockroaches that would facilitate their population development.

Biological parameters of the triatomines such as: development of the biological cycle, egg laying rate, egg hatching rate, period of embryonic development among others, vary according to species and environmental conditions, and are greatly influenced by the availability of blood supply (BRASILEIRO 1984; SCHOFIELD 1985; LIMA *et al.* 1987; DAFLON-TEIXEIRA *et al.* 2009). While biological data are available for many species, comparisons among studies are difficult due to differences in experimental design, especially in relation to temperature and humidity (often uncontrolled), feeding frequency, blood meal sources (ZÁRATE 1983), and methods of statistical analysis to interpret the results. Controlled experimental conditions when coincide with optimal conditions for a species may favor the high rate of reproduction (MARTÍNEZ-IBARRA & KATTHAIN-DUCHATEAU 1999). Although the present study was not conducted under controlled conditions, the use of laboratory conditions, ambient temperature and humidity and food, provides an estimate of the reproductive capacity of triatomines. Extrapolation from the laboratory data for natural populations are relatively easy in triatomines, since in the wild all stages of life occur in a single kind of environment and exhibit similar biological requirements (ZÁRATE 1983).

In Southern Cone countries, control of the primary insect vector, *T. infestans*, has been an effective measure against the incidence of Chagas disease. To maintain vigilance, it is necessary to focus on secondary vectors, including *T. juazeirensis* and *T. sherlocki*. Evaluation of their potential as vectors includes numerous biological parameters, especially the capacity to reproduce (BRASILEIRO 1984; COSTA *et al.* 1986; LIMA *et al.* 1987; MARASSÁ *et al.* 1998; DAFLON-TEIXEIRA *et al.* 2009). In this study, the data clearly demonstrate that *T. juazeirensis* has a greater reproductive capacity to propagate than *T. sherlocki*.

Compared with the data in the literature, *T. juazeirensis* was also more prolific in relation to *T. brasiliensis* (93.5 versus 53.4 respectively) that was maintained using pigeons (*Columba livia* Gmelin, 1789). (DAFLON-TEIXEIRA *et al.* 2009), but lower than *T. brasiliensis* (142) (SOARES *et al.* 2000) and *Triatoma rubrofasciata* (De Geer) (242.9) (BRAGA *et al.* 1998), fed on mice (*M. musculus*). The difference in egg laying by *T. brasiliensis* displayed a difference based on the food source highlighting the influence exerted by feeding on the fertility and fecundity (COSTA *et al.* 1986, GUARNERI *et al.* 2000).

The egg hatching rate for *T. juazeirensis* and *T. sherlocki* were 93.7 and 60.9%, respectively, whereas for *T. brasiliensis* by SOARES *et al.* (2000), this rate was 92.5% when maintained on mice, also under laboratory conditions. It must be stressed that *T. brasiliensis* is a phylogenetically related species to the ones herein analyzed. Two other species maintained on chickens [*Gallus gallus* (Linnaeus)], *Triatoma sordida* (Stål) and *T. infestans*, were recorded with rates of 91% and 94%, respectively (OSCHEROV *et al.* 2004). However, other studies showed that the rates of egg

hatching are variable for different species of triatomines (COSTA *et al.* 1986, MARASSÁ *et al.* 1998).

The number of copulations between the breeder pairs also contributes to the number of eggs deposited. Several studies have demonstrated that mating is a stimulus for the production of eggs, making females more fecund (BRASILEIRO 1984; LIMA *et al.* 1987; DAFLON-TEIXEIRA *et al.* 2009). The eggs laid by *T. juazeirensis* also showed the highest percentage (93.7%) of hatching compared to *T. sherlocki* (60.9%). These data show that the first species had a higher reproductive success in the laboratory conditions used here. This suggests that the group of males and females of *T. juazeirensis* were fertile.

The developmental period for the eggs of *T. juazeirensis* and *T. sherlocki* showed similar lengths with an average of 20.2 days and ranging from 14 to 28 days at temperatures that ranged between 21.6 °C to 30 °C. The comparison between these periods has not been significant. The incubation period of eggs from *T. brasiliensis* was reported to be 25 days at 24 ± 2 °C (SOARES *et al.* 2000), while *Triatoma pseudomaculata* Corrêa & Espínola, 1964 was 18 days at 28 °C (GONÇALVES *et al.* 1997). The embryonic development of eggs of several species of triatomines is also influenced by temperature, as first demonstrated by NEIVA (1913) for *T. infestans*. RANGEL (1982) evaluated the effects of that variable in the period of incubation of the eggs of other 13 species, noting that for eggs incubated between 30 °C and 34 °C, the incubation period was shorter than in the control group maintained at 25 °C ± 3 °C.

The survival rate of *T. juazeirensis* and *T. sherlocki* was recorded only for females that died during the experiment. Thus, we observed median survival of 16.24 weeks and 16.4 weeks, respectively. Although the averages for these two species are comparable, it is important to note that until the last day of observation (154 days) of 15 females of *T. juazeirensis* 12 died while in the same period, only seven females of *T. sherlocki* died (Table 3). However, in applying the statistical PARA test Chi-square (χ^2 : 3.11, $p > 0.01$) revealed that the averages were not statistically different. Our results are consistent with the median survival reported for *T. infestans* (16.40 weeks) (RABINOVICH 1972).

The species *Rhodnius prolixus* Stål, *Triatoma rubrovaria* (Blanchard), *T. rubrofasciata* as and 18 other species of triatomines all demonstrate hatching rates that are dependent on the ambient conditions including temperature and humidity (GOMEZ-NÚÑEZ 1964; BRAGA *et al.* 1998; DAMBORSKY *et al.* 2005). Together, these observations suggest that the use of laboratory conditions provide distinct rates obtained for egg laying and hatching reflect the variable capacity of a particular species to be adapted to lab conditions. Therefore, since *T. juazeirensis* exhibited greater reproductive fitness for all variables analyzed, we suggest that this species might be better adapted than *T. sherlocki* to the lab conditions of which they were submitted.

The differences between *T. juazeirensis* and *T. sherlocki* on oviparity and fertility were statistically significant and informative, suggesting that the biotic potential between the two species is distinct. These features observed for *T. juazeirensis* could give it an advantage over *T. sherlocki*. Maybe these features are involved in the low domiciliary infestation rates observed for *T. sherlocki* (ALMEIDA *et al.* 2009). Although not yet found in sympatry, they inhabit biotopes with similar characteristics. Other aspects bionomic as feeding time, amount of blood ingested, time of defecation and starvation resistance are likely to complement these results, contributing to the understanding of the importance of these species as a potential vector of the parasite *T. cruzi*.

In view of the results obtained here and other previously published data on *T. juazeirensis* and *T. sherlocki*, it is recommended that a

constant surveillance should be maintained as part of an effective control program for these species; particularly in small isolated communities such as Santo Inácio and Encantado, Bahia State. In these small communities, the mining activities performed by miners favor the building of homes in undeveloped areas that promotes contact with potential vectors of *T. cruzi*. Furthermore, the behavior of *T. juazeirensis* to colonize also wood habitats increases its possible colonization of peridomestic spaces (CARBAJAL DE LA FUENTE *et al.* 2008).

Behavioral plasticity appears to be associated with the ability of triatomines to colonize and re-colonize domiciles after insecticide spraying, as well as different ecotopes (NOIREAU *et al.* 2009). In addition to the opportunity of home environments to provide stable climates and access to food sources (RAMSEY & SCHOFIELD 2003) contribute for establishing numerous colonies. Together, they positively influence the capacity of triatomines to re-infest the domestic environment after the application of insecticides. High population densities of triatomines in human dwellings has been associated to the Chagas disease transmission (DIAS 1995), which is surely related to the reproductive potential of a given species.

ACKNOWLEDGEMENTS AND FUNDING

This research was supported by the Brazilian National Council for Scientific and Technological Development (CNPq) and The State of São Paulo Research Foundation (FAPESP).

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Recebido em: 14/12/2011

Aceito em: 25/03/2012

Como citar este artigo:

Neiva, V.L., M. Gumiel, M.M. Lima, T.C.M. Gonçalves, D.W. Provance, C.E. Almeida & J. Costa, 2012. Deposition, Incubation Period and Hatching of Eggs from *Triatoma juazeirensis* Costa & Felix and *Triatoma sherlocki* Papa, Jurberg, Carcavallo, Cerqueira & Barata (Hemiptera: Reduviidae) under Laboratory Conditions. EntomoBrasilis, 5(1): 130-136.

Acessível em: <http://www.periodico.ebras.bio.br/ojs/index.php/ebras/article/view/215>

