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Jumping Spider, *Plexippus Paykulli (Audouin) (Salticidae)* Exhibits Interspecific Kleptoparasitism; Success Rate and Prey Preference

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Abstract: ***Salticids are distinct for the develop of unique predatory strategies like Kleptoparasitism .Present paper deales with the interspecific kleptoparasitism , success rate and prey preference of jumping spider Plexippus paykulli in snatching prey from the host ant , Monomorium spp(Formicidae).Study is done in Bidar ,Karnataka,India in April and May 2010 for six alternate days with six hours duration each day from 700hrs to 1100 hrs and 1400hrs to 1600hrs.Prey carried by the Host Ant included winged Camponotus sp (formicidae), Wasp(vespidae) , Ephemera (ord. Ephemeroptera) and egg cases. Success rate is more in snatching the living and dead prey in comparison to egg cases. Plexippus paykulli prefers living prey to the dead. More food consumption is observed during 900 to 1100 hrs.***

Keywords: Plexippus paykulli, kleptoparasitism, Prey preference, Monomorium sp

1. Introduction

In tropics jumping spiders (Salticidae) are the dominant spiders [1], and Ants are (formicidae) the dominant insects [2], and their inter action is quoted by Nelson & Jackson, 2005, 2006 a, b; Nelson et al 2006 [3]. Visual acuity of jumping spiders is comparatively more efficient than other spiders [4].Visual cues about prey identity, size, distance & orientation influence the salticides' speed & direction of approach [5]. Salticid slowly creeps upto its prey until close enough for an attack , pauses and finally leaps at the prey [6] Spider can move its carapace at 450 to look around Generally jumping spiders are insectivores [7]. They display opportunistic predatory behavior [8]. Most salticids are cursorial hunters than web builders [9] and follows a circuitous course to approach the prey. Kleptoparasitism (parasitism by theft) observed in salticids involve the ambush and snatching the prey from other interspecific or intraspecific animals. Salticids developed distinct behavioural flexibility and have undergone local adaptation and coevolution of prey-predation. Types of behavioural responses seen in salticids include [10].

- Short look- stop & fix the eyes on prey
- Long look—fix the eyes on prey for more than 10s
- Threat display –Warning display by raising the leg
- Stalk—adopt stalking behaviour,
- Attack pose - adopt attack posture but does not attack
- Attack - attack and Snatching the prey
- Retreat –moving away to the resting place with the prey

Foraging tactic in kleptoparasitic spiders change seasonally [11] some of the spiders show sex-specific kleptoparasitism [12]. Male spiders feed less frequently than female spiders. P.paykulli is polyphagous, preying on variety of arthropod orders like odonata, Hymenoptra, Lepidoptera, Diptera, Orthoptera and Aranea [Edwards et al]. Polyphagy may be necessary for nutritional reasons.

2. Study Area

The predatory strategy of the salticid was observed on the wall of a building in Bidar city. Bidar co-ordinates 170 55' North Latitude and 770 39' East Longitude, with average temp 320 to 400 and humidity 57 %to 78% at 1925 feet above sea level. The unique predatory strategy of Plexippus paykulli, ambushing the trail of ants and snatching the food from ants' mandibles, has been observed during summer (April & May) months for the last six years .

3. Materials and Methods

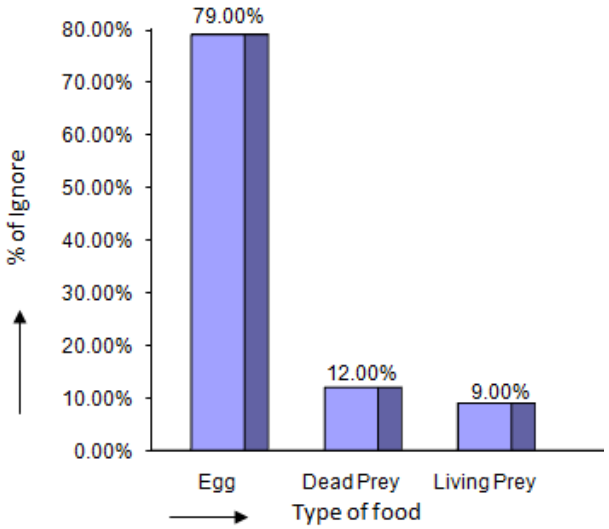
The observation for this paper was done in April and May 2010 from 7 00hrs to 1100 hrs and 1400 hrs to 1600 hrs for 6 days leaving a gap of one day after each day's observation. The spider under observation was marked with orange enamel paint and collected each day after the observation with a wet paint brush and introduced into the water taken in a 200 ml beaker and transferred immediately to a plastic bottle and carried to the laboratory & was kept in a cardboard box of 4''x 2½'' x 1½'' with holes on the cover. The succeeding day was a gap and no food was given to the spider. Wet cotton swab was kept in the box for the water requirement. Female adults were selected for observation.

The kleptoparasitic spider, the Host ant and preys were identified using standard keys [14 &15]. Spider was identified as jumping spider, Plexippus paykulli (salticidae). The host ant belonged to genus Monomorium (fa.formicidae) the food/prey included winged carpenter ants-Camponotus spp (fa. Formicidae), Wasps (fa.vespidae)and Ephemera (ord. Ephemeroptera). Two months observations are pooled to single. Each day is divided into three parts of 2hrs each from 700-900hrs, 900-1100hrs and 1400-1600hrs. Success and failure percentage in stealing the prey (food) is calculated on the number of attempts and the % of ignored, on the basis of number of avoided prey spotted during each part of the day . Since number of observations is very large 'n' is taken as the number of days (n=6.)

4. Result and Discussion

Availability of the food(prey) as egg was more than living and dead preys. In the trial and error, spiders encountered success and failures. Success rate is more for stealing the living prey and less in eggs , in the order; Living prey (93.9%)> dead prey (93.42%)> eggs (88.02 %)(table 1). Successful capturing of living prey indicates the carnivorous instinct of the jumping spiders. Less success rate or more failure in snatching the egg may be due to the narrow gap between the mouth parts of the kleptoparasitic spider and mandibles of the host ant. Bigger size of living or dead prey facilitates the precise attack on the prey without coming in close contact with the ant's mandibles. A steady ant column with abundant food was formed during 900-1100hrs and maximum stealing and feeding by P.paykuli was observed during this time. At few times P.paykuli has ignored the prey in the order- egg (79%)> dead prey (12%)>living prey(9%) (Graph-1) . Among the four behavioral responses, the kleptoparasite utilized maximum time to attack and snatch the living prey .Little time was spent for long- look and short -look. The sequence included;- spotting the prey-fast running-short pause-running-pause-intercepting the ant column –snatch the prey-retreat-feeding. While stealing the egg, after spotting it, the sequence included- short look-long look- moving a little closer – rotating the body- stalk-intercept- attack(stealing the food)- retreat – feeding.

Comparing the pairs of events (type of preys), egg vs dead prey, negative correlation is observed. This shows spider prefers flies ,ants or wasps to eggs.(Table- 2,) .Positive correlation observed between egg and living prey ,indicating less availability of living prey and P.paykulli consumed eggs as an alternate preference . Significance is found between egg vs living prey and dead vs living prey ($p<0.05$) (table.-3). In unsuccessful attempts comparing egg & dead prey and egg & living prey negative correlation is observed (Table-4) . Failure is significant in stealing egg vs dead prey, egg vs living prey. But it is insignificant in dead prey vs living prey.(Table-5)



Graph 1: Percentage of behavioral response – ignoring the preys exhibited by P.paykulli

Table 1: Percentage of success and failed attempts in stealing the prey by Plexippus paykulli from the Ants.

Type of prey	Percentage of success			Percentage of failure		
	700 – 900hrs	900 – 1100hrs	1400-1600hrs	700 – 900hrs	900 – 1100hrs	1400-1600hrs
Egg	84.92	88.02	78.38	15.08	11.98	21.62
Dead prey	91.38	93.42	92.45	8.62	6.58	7.55
Living prey	82.5	93.9	88.9	17.5	6.1	11.1

Table 2: Paired samples correlations -success in stealing the different types of preys by P.paykulli

Type of food	*Time*	*N*	*Correlation*	*Significance*
Egg & Dead prey	7-9hrs	6	-0.642	0.169
	9-11hrs	6	-0.215	0.683
	16-18 hrs	6	0.524	0.286
Egg & Living prey	7-9 hrs	6	0.833	0.039
	9-11 hrs	6	0.908	0.012
	16-18 hrs	6	-0.266	0.610
Dead &living prey	7-9 hrs	6	-0.613	0.196
	9-11 hrs	6	-0.562	0.246
	16-18 hrs	6	-0.030	0.955

Table 3: t-test and p-values in the success of stealing the different types of preys by P.paykulli

Food	Time	Paired difference mean	Std deviation	Std- error mean	95% confidence Interval of the difference		t	dt	Significance (2- tailed)
					Lower	upper			
Egg & Dead fly	7 -9.00	9.0000	2.6833	1.0955	6.1841	11.8159	8.216	5	0.000
	9 -11hrs	-7.1667	45.2080	18.4561	-54.6096	40.2763	0.388	5	0.714
	16 - 18 hrs	1.5000	1.8708	0.7638	-0.4633	3.4633	1.964	5	0.107
Egg & living fly	7 -9 hrs	12.3333	1.2111	0.4944	11.0624	13.6043	24.945	5	0.000
	9 -11 hrs	15.3333	1.2111	0.4944	14.0624	16.6043	31.013	5	0.000
	11 - 13 hrs	9.6667	17512	0.7149	7.8289	11.5044	13.521	5	0.000
	16 - 18 hrs	4.3333	2.994	1.2019	1.2439	7.4228	3.606	5	0.015
Dead & living fly	7 - 9.00 hrs	3.3333	2.0655	0.8433	1.1656	5.5010	3.953	5	0.011
	9 -11 hrs	22.5000	45.4434	18.5522	-25.1899	70.1899	1.213	5	0.279
	16 - 18 hrs	2.8333	2.137	0.8724	0.5907	5.0760	3.248	5	0.023

Table 4: Paired samples correlations in failure in stealing the preys by P.Paykulli

Type of food	Time	N	Correlation	Significance
Egg /Dead prey	7-9hrs	6	-0.647	0.165
	9-11hrs	6	-0.400	0.432
	16-18 hrs	6	0.158	0.765
Egg / Living prey	7-9 hrs	6	-0.059	0.912
	9-11 hrs	6	0.894	0.16
	11-13 hrs	6	-0.158	0.765
	16-18 hrs	6	-0.316	0.541
Dead/ living prey	7-9 hrs	6	+0.059	0.912
	9-11 hrs	6	0.447	0.374
	16-18hrs	6	0.500	0.313

Table 5: Paired samples' "t" test and p-values during the failure in stealing the different types preys by P.paykulli

Food	Time	Paired difference mean	S.D	S.E Mean	95% confidence Interval of the difference		t	df	Significance
					Lower	upper			
Egg/D.F	7-9 hrs	2.3333	1.36663	0.5578	0.8995	3.7671	4.183	5	0.009
	9-11 hrs	2.5000	1.0488	0.4282	1.3993	3.6007	5.839	5	0.002
	16-18 hrs	2.0000	0.8944	0.3652	1.0614	2.9386	5.477	5	0.003
Egg/L.F	7-9 hrs	2.0000	1.0955	0.4472	0.8504	3.1496	4.472	5	0.007
	9-11 hrs	2.8333	0.4083	0.1667	2.405	3.2618	17.000	5	0.000
	16-18 hrs	2.0000	1.0955	0.4472	0.8504	3.1496	4.472	5	0.007
D.F/L.F	7-9 hrs	-0.3333	1.0328	0.4216	1.4172	0.7505	-791	5	0.465
	9-11 hrs	0.3333	0.8165	0.3333	-5235	1.1902	1.000	5	0.363
	16-18 hrs	0.000	0.8944	0.3652	-9386	9386	-000	5	1.000

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