

Dragonflies of Polillo Island, Philippines

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Introduction

Polillo is a small group of island (27 islands in total) east of central Luzon (Figure 1). It is made up of four main island viz. Polillo I, Patnanungan I, Jomalig I and Palasan I and several islets. This island group has relatively flat to gentle sloping terrain and the highest point is only 300 m asl (Mt. Maluhod) in Polillo Island (ca 700 km²) which is the largest in the group and the third largest island in greater Luzon biogeographic region.

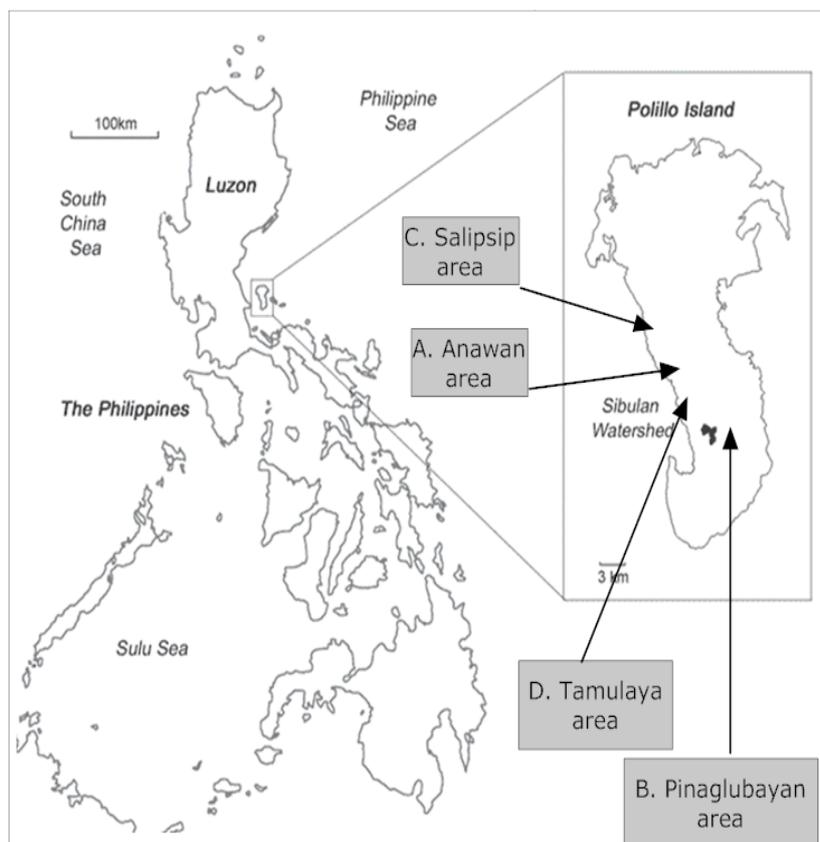


Figure 1: Map of Polillo Island



On the first botanical survey of the island (Robinson 1911), the island was covered by lush lowland forest. However during the middle of the 20th century several logging concessions exploited this primary forest trees. Hämäläinen & Müller (1997), based on second hand information, mentioned that the island is heavily deforested and cultivated with few remaining patches of forest left.

Faunistically, the Polillo island group is interesting because of its insular endemic species. McGregor's (1910) study on birds is the first faunal account in the island. Since then various accounts on vertebrates are available from several workers (Bossuyt & Dubois 2001, Leviton 1963, Manuel 1957) and more recent reports on vertebrate surveys. Ecological and conservation issues of some of the island species are currently being studied such as Grey's Monitor Lizard and various threatened birds (Alviola et al. 2003, Dans, pers. comm.).

Despite this relatively extensive data on vertebrate groups, data on invertebrates including Odonata from the island is very limited. Until now, 17 odonate species were recorded on the island of Polillo based on specimens collected by Boettcher in 1915 (Hämäläinen & Müller, 1997) including an undescribed species of *Sulcosticta* (van Tol, 2005). Although some new material is available in the University of the Philippines-Los Banos (UPLB) collection that was collected opportunistically by students, no published account of this newer collection is available.

In the present publication the species are presented that were recorded during an odonatological survey in 2009 on Polillo Island.

Methods

Odonata were recorded and voucher specimens collected between April 16 and April 27 2009 although bad weather condition especially in the last part of the fieldwork precluded fieldwork for few days. This bad weather condition also prevented a further trip to the northern most forest patches in the island.

The island was relatively wet with several water systems. I selected four areas based on local advice with potential undisturbed areas. I surveyed as many suitable habitats as possible within these areas. These areas were labeled to the nearest local community settlement to facilitate future explorer.

Two (Pinaglubayan and Salipsip) of the selected sites is still covered by old growth secondary forest. Although the old Dipterocarp is absent, the lush secondary growth still makes the forest floor dim, and in some areas barely exposed to sunlight. Fragment of old secondary growth is also noted along slopes in areas already farmed by the locals.



Logistics

From Manila I took a 4 hour car ride to Real, Quezon. I then took a 3 hour motor boat ride to the municipality of Polillo, Polillo Island. There are regular ferries to Polillo with two trips a day. I stayed for four days each in Pinaglubayan and Salipsip area, and the remaining days visiting Anawan and Tamulaya areas while staying in the town proper. Local jeepney and hired motor cycle served as vehicle to visit each sites.

Use of Money from the IDF

The money granted by the IDF was used for the wages of local workers and transportations. Local workers served mainly as field guides and also help in locating and collecting Odonata (Figure 2). Most of the expenses incurred during the assessment came from IDF grant.



Figure 2: Assistant and field guides exploring forested stream in Salipsip area

Area surveyed

A. Anawan area, Polillo

This is located in the west central part of the island. I surveyed the main river (Anawan Dako) about 7-8km stretch starting from the forested headwater down to the agricultural portion a few hundred meters from the western coast. Beside



the main river, tributaries (creek, stream, spring, rivulets) were explored, some reaching several hundred meters up. Surrounding rice paddies, *Nipa* swamps and puddles were also searched.

B. Pinaglubayan area, Polillo

This is located in south-central part of the island. I surveyed the upper reaches of two river system and its surrounding tributaries. The first river drains to the eastern (Pacific) coast. I explored about 6km stretch of this river that was surrounded by alternating portion of agricultural mainly coconut, and secondary forest. The second river though narrower than the first was mainly forested for the most part being part of the municipal watershed and drain in the western coast. This river was explored for about 5km. Several forest puddles, forested and open ponds, swamps and rice paddies were also explored.

C. Salipsip area, Polillo

This is the northern most site of the trip situated in the north-central part of the island. Two river systems were surveyed along its tributaries which both drain in the eastern coast. The first river mainly forested was surveyed from headwater down to the junction of another river. I then moved upstream to this second river which was a mixture of agricultural and secondary forest. This river system was surveyed with a total stretch of nearly 12km. The second river system was forested which was situated at the foot of Mt. Malulud. I explored about 15km stretch of this river along its feeding tributaries.

These two river system was the most forested with scattered primary trees remaining. Several forest puddles, forested ponds and swamps were also explored.

D. Tamulaya area, Polillo

This is situated in south western part of the island. I surveyed few hundred meters downstream the waterfall which was dammed for local use and about 4km upstream. Several feeding streams and springs were also explored.

The area was mainly agricultural with scattered forested patches in the upstream region of this small river.

Results

Sixty-two species of 14 families and 41 genera were found. An additional two unidentified Aeshnidae were seen. Two of the 17 previously recorded species were not found. An observed *Anax* could not be determined and it was uncertain whether it was the previously recorded *A. guttatus* or represented an additional island record. The *Gynacantha* material could not be compared at the moment with the previously recorded species.



Forty-seven of the recorded species are new to the island and one species is new to the Philippines. Furthermore, five of the recorded species (*Drepanosticta*, *Sulcosticta*, *Amphicnemis*, *Teinobasis*, *Heliogomphus*) are new or possible new to science. An additional four of the recorded species (*Drepanosticta*, *Amphicnemis*, *Teinobasis*, *Rhinocypha*) shows variation from known species or need more material for better comparison and some of them may even represent an additional species new to science. The first male of *Idionyx salva* was also found.

Annotated List (Localities where species were recorded are given in brackets; *based on old record only)

Platystictidae

1. *Drepanosticta* cf. *philippa*/*trimaculata* (A, C, D)

This solitary damselfly was the second most commonly encountered species in the areas surveyed. It prefers dark moist places.

The island population probably represents two species, those with three yellow markings on the synthorax resembling *D. trimaculata* and those resembling *D. philippa*. The *D. philippa* population is the least encountered. Comparison with the true *D. philippa* and *D. trimaculata* materials is needed to verify the taxonomic status of the Polillo population.

2. *Drepanosticta* sp. n. (A)

A single newly emerged male (kept alive for 3 days) was encountered on a dark stream edge. The exuvia was unfortunately not found.

Head. – Labium and mandible dark brown lighter on apices; labrum cream except brownish outer margin; anteclypeus, genae, apical portion of scapus and pedicel cream; postclypeus dark brownish and rest of the head matt black.

Thorax. – Prothorax yellowish: anterior lobe with very short paired erect flat projection curving caudad then direct dorsad with blunted apices; middle lobe simple; posterior lobe produced into large flat collar like process, the medial outer border bluntly pointed directed dorsad, the outer margin smoothly curved with long setae along the entire margin. Synthorax bronze black except metepisternum yellowish, metepimeron brownish with yellowish posterior border.

Wings. – hyaline brownish vein with Ab and Ac forming V-shape; Px 11/10 forewing and hindwing respectively; Arculus beyond Ax2; pterostigma light brown subcosta little longer than costal side.

Coxa, femur and tibia. – including spines yellowish.

Abdomen. – S1 bronzy black yellowish ventrally, S2 bronzy black, S3-S7 bronzy



black with basal yellow ring $1/8^{\text{th}}$ the length of each segment, S8-S9 bronzy black with yellowish streak ventro-basal side, S10 black shorter than anal appendage. Anal appendage brownish basally black; superior dorso-ventrally flattened more pronounced in distal half and broadly triangular laterally. Inferior same length with superior, robust basal half and narrow subcylindrical outer half with apices curved inward.

Measurement. – Hw 18mm; Abdomen 31mm

Remark. – The species belong to *Drepanosticta moorei*-group characterized by poorly developed transverse occipital carina and distinct yellowish stripe in the synthorax (van Tol 2005). The group consists of two species (*D. moorei* and *D. luzonica*) both confined in Luzon Island until the present species coming from Polillo Island.

The present species is closer to *D. moorei* by having a large posterior prothoracic lobe which in *D. luzonica* is short. Unlike *D. moorei*, it has short anterior lobe, not reaching the middle lobe and lacks the long subcylindrical anterior lobe process.

Presently I refrain from naming and formally describing the species until more material is available.



Figure 3: *Sulcosticta sp.n.*

3. *Sulcosticta sp.n.* (A, B, D) (Figure 3)

This undescribed species was mentioned by van Tol (2005) giving a preliminary description but no formal name was given due to poor state of the available material.



The species was frequented in dark or partial shade seepages hanging on the tips of leaf blades. This habitat was in contrast to the species of the same genus that I encountered in Isabela, Luzon Island that prefers shallow forest rivers.

Platycnemididae

4. *Risio cnemis serrata* (Hagen, 1863) (A, B, C, D)

This was the most variable *Risio cnemis* species I encountered in terms of synthorax markings. It was also the most common and widespread forest damselfly in the island found from dark moist forest floor to shady or partially lit forest creek sides.

5. *Risio cnemis haematopus* (Selys, 1882) (A, D) (Figure 4)

This damselfly was frequented in shady moist vertical surfaces of boulder and cliff where females were noted ovipositing. Sometimes it was found perching on twig or leaf blade of nearby vegetations but always near vertical surfaces.



Figure 4: *Risio cnemis haematopus*

A single aberrant male individual with nearly black synthorax was found. Aside from the distinct color difference of the synthorax, no other structural difference was noted. More material of this color morph is required for further analysis.

The posterior pronotal structure of Polillo females were inclined forward



resembling nearly that of *R. fuligifrons* than the illustration from Catanduanes material (Gassman & Hämäläinen, 2002).

6. *Risiocnemis confusa* Hämäläinen, 1991 (B, D)

The Polillo population has entirely black head, thorax and legs. Its abdomen is black from S1-S5, the apical border of S6 is brownish and the remaining segment is red including the appendages.

As mentioned by Hämäläinen (1991) this species closely resembles *R. praeusta* (Leyte, Dinagat, Panaon, Biliran) and *R. erythrura* (Siargao, Mindanao) being black with reddish apical abdominal segments. Contrary to the two that perches above 1 foot from the ground, this species was found on dark wet forest floor.

7. *Risiocnemis atropurpurea* (Brauer, 1868) (A, C, D)

8. *Risiocnemis polilloensis* Hämäläinen, 1991 (B, D)

This species seems to prefer moist dark forest floor similar to *R. confusa*.

Protoneuridae

9. *Prodasineura integra* (Selys, 1881) (A, B, C, D)

Coenagrionidae

10. *Amphicnemis* sp.n. (A) (Figure 5)

This species belong to *Amphicnemis furcata*-group presently with four described species. It was found on a small Nipa swamp along with *Teinobasis olivacea*.



Figure 5:
Amphicnemis
sp.n.



11. *Agriocnemis f. femina* (Brauer, 1868) (A, B, D)

12. *Agriocnemis pygmea* (Rambur, 1842) (A, B, D)

13. *Amphicnemis* sp. (D)

A single small female was found on a small spring perching on fern leaf. Until male material is found the correct taxonomic status of the species remains open.

14. *Argiocnemis rubescens intermedia* Selys, 1877 (A, B, D)

15. *Ceriagrion* sp. cf. *lieftincki* (B)

A small population was encountered in a backyard pond. The synthorax was more greenish compared to those found in Mindanao with synthorax and abdomen of similar coloration (orange). Beside slight variation in the superior anal appendage, the genital ligula resembles *C. lieftincki*. Further study and more material from various localities are needed to check the taxonomic status of the Polillo population.

16. *Pseudagrion p. pilidorsum* (Brauer, 1868) (A, B, C, D)

17. *Teinobasis corolla* Needham & Gyger, 1939 (A, B, C, D)

18. *Teinobasis* sp. cf. *corolla* (A, B, C, D)

This species closely resembles *T. corolla* save for the blackish postclypeus and minor variation in the superior anal appendage.

19. *Teinobasis filiformis* (Brauer, 1868) (A, B, C, D)

This small damselfly was relatively abundant and widely distributed among the *Teinobasis* species present in the island. It was frequented in shady areas with muddy substrate.

20. *Teinobasis samaritis* Ris, 1915 (B)

21. *Teinobasis* sp. cf. *strigosa* (A, B)

It was the largest *Teinobasis* noted in the island. It prefers shady areas perching underneath the foliage of stream bank vegetations.

22. *Teinobasis* sp. cf. *olivacea* (A)

This species falls under *Teinobasis recurva* in the key (Needham & Gyger, 1939). However the superior anal appendage is more closely related to *T. olivacea*. The population was noted only in the *Nipa* swamp.

23. *Teinobasis martinschorri* spec. nov. (D) (Figures 6-9)

Etymology. – Named after Martin Schorr, a masculine name in the genitive case.

Material. – Holotype ♂: Tamulaya, Polillo, Polillo Island. April 25, 2009. RJTV leg. (to be deposited in RMNH); Paratype: 2♂ same locality and date label (in the author's collection).



Head. – Labium and mandible black; labrum shiny black; genae yellowish brown. Anteclypeus black except for the bluish streak at both lateral angle, and bluish triangular spot in the center. Postclypeus shiny black. Frons black except for the bluish streak at the occipital margin. The rest of head is matt black except for the blue ovoid spot that is medial to the pedicle, and junction of pedicle and scapus whitish.

Thorax. – Anterior lobe of Prothorax short erect blackish. Median lobe black, bluish laterally. Posterior lobe short, fan-shape and black with bluish lateral margin. Synthorax – mesepisternum black with bluish streak occupying middle half bordering the humeral suture with small streak extending into black mesepimeron (Figure 8), metepisternum and metepimeron bluish except for the black distal border. Legs – coxa, trochanter and femur light yellowish. Tibiae is light yellow except for the dark posterior margin. Femoral spines blackish.

Wings. – Hyaline with black veins. Pnx 14/13 forewing and hindwing respectively. Arc opposite Anx2, R4+5 at subnodus, IR3 further distad. Pterostigma brown with subcostal side a little longer than costa.

Abdomen. – S1 dorsum black and broader at the apical half, yellowish ventrally. S2 dorsum black and bluish ventrally; S3-S6 dorsum black, lighter ventrally. S7-S10 entirely black including the appendages except for the blue apical narrow ring in S8-S9. Upper branch of superior appendage viewed dorsal has concave outer margin with longer inner border longer, viewed laterally the outer margin broadly triangular and the inner margin ear-shaped (see figure 6). The lower branch of superior appendage is longer than the upper, up-curved, tapered tip. The inferior appendage is robust, a little shorter than the lower branch.

Measurement. – Abdomen + cerci: 32mm; Hw: 22mm

Female. – Unknown.

Remarks. – The present species belong to group I characterized by vein R4+5 and IR3 with origin widely separate before converging at the first intervening vein. This group presently has 7 species in the Philippines widely distributed in Mindanao and Luzon biogeographic regions (Hämäläinen & Müller 1989).

The present species has dark bluish synthorax compared to the usual orange in other Luzon species in this group. Presently, *T. annamaijiae* and *T. ranee* is the only member of the group with dark/bluish synthorax in the Philippines. The present species though clearly differ from these two species being smaller, different anal appendage shape and body and abdominal color pattern.

Interestingly, the anal appendage of the present species has closer resemblance to *T. hamalaineni*, a species under group II (Müller 1992). The two species though differ in synthorax and abdominal color pattern, the S8-S9 in *T. hamalaineni* is blue while in *T. martinschorri* spec. nov. is entirely black.



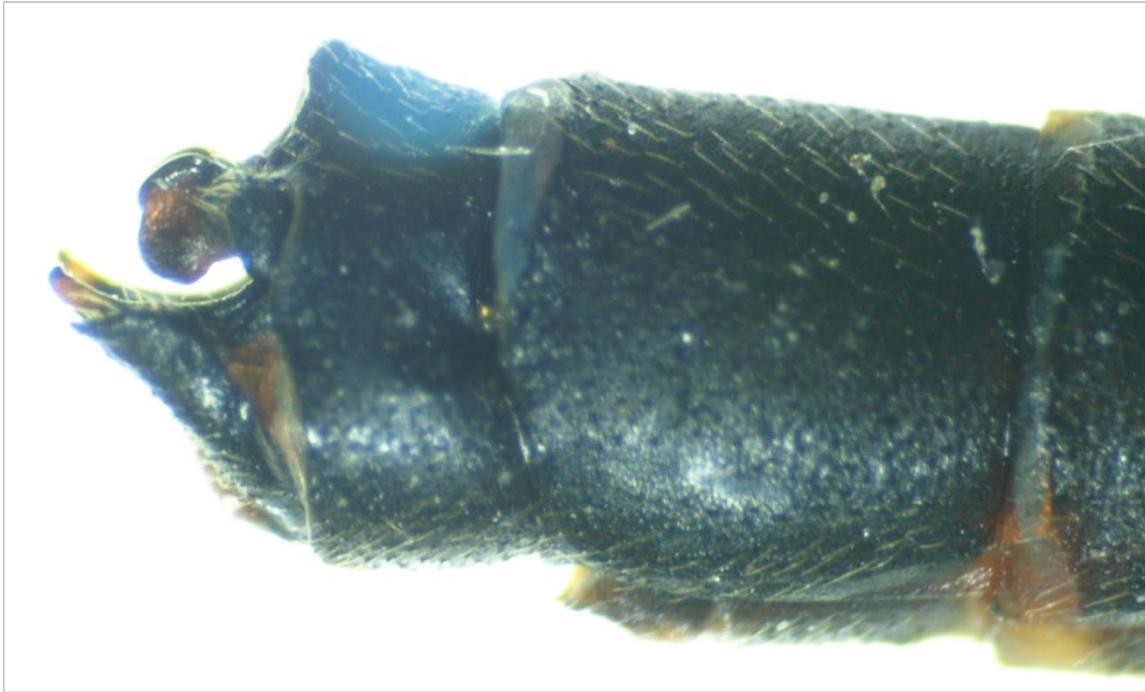


Figure 6: *Teinobasis martinschorri* sp.n., dorsal view photograph of superior anal appendage

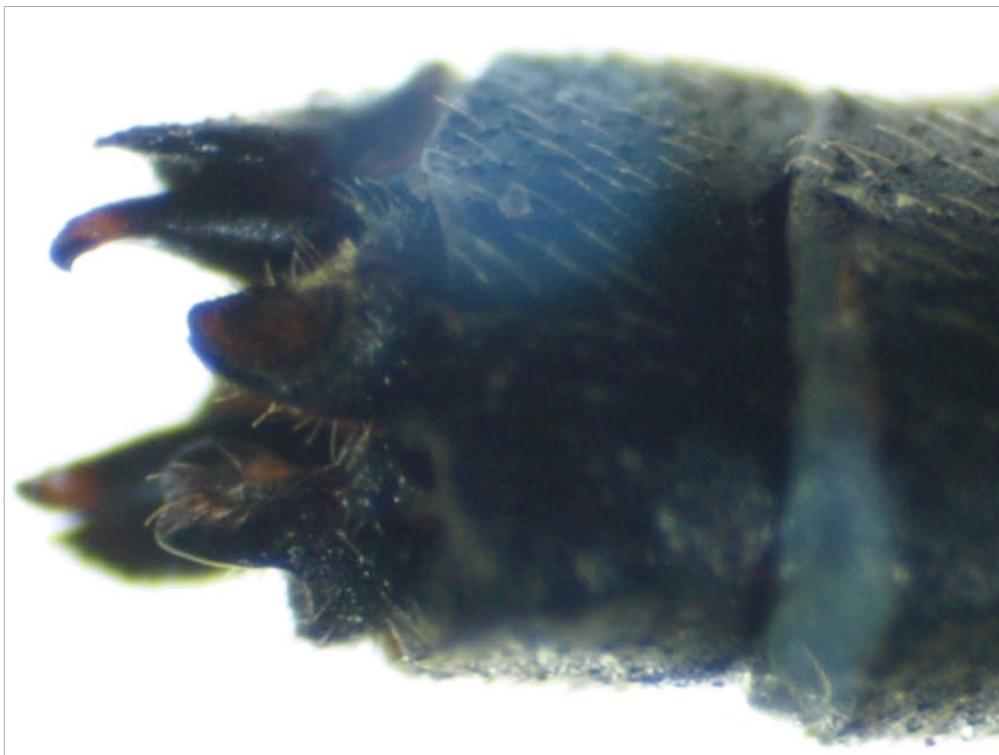


Figure 7: *Teinobasis martinschorri* sp.n., lateral view photograph of superior anal appendage





Figure 8: *Teinobasis martinschorri* sp.n., lateral view photograph of synthorax

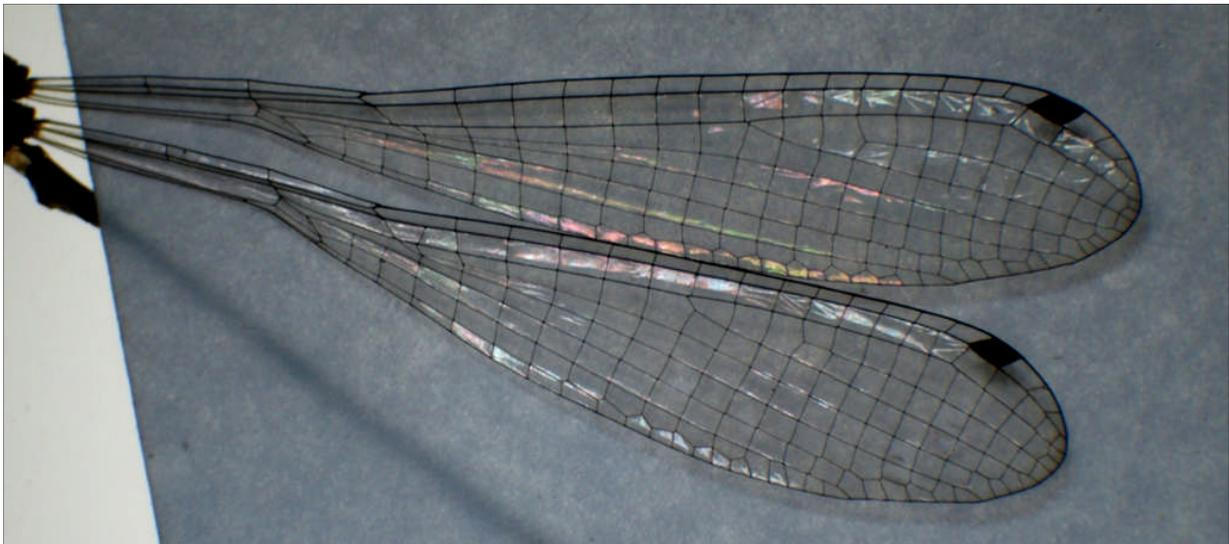


Figure 9: *Teinobasis martinschorri* sp.n., photograph of wing

24. *Xiphiagrion cyanomelas* Selys, 1876 (B)

The typical “lantern-shape” marking on the 9th abdominal segment was absent otherwise no other difference was noted.

Megapodagrionidae

25. *Rhinagrion philippinum* (Selys, 1882) (A, B, C)

The red surface noted on ventral abdominal surface of males is restricted to S8-S10 similar to Isabela, Luzon population. The Cebu Island population presently housed in the author’s collection has more extensive red markings. Further study on *R. philippinum* along its known range is needed to delineate its geographic variations.



Chlorocyphidae

26. *Cyrano unicolor* (Hagen in Selys, 1869) (A, B, C, D)

The Polillo population was predominantly black color morph.

27. *Rhinocypha colorata* (Hagen in Selys, 1869) (A, B, C, D)

28. *Rhinocypha turconii* Selys, 1891 (A, C)

The island population lacks the antehumeral stripe, the posthumeral stripe on the other hand is markedly reduced occupying only the middle third of the metepimeron. The hind wing is markedly broader.

Euphaeidae

29. *Euphaea refulgens* Hagen in Selys, 1853 (A, B, C, D)

Calopterygidae

30. *Neurobasis luzoniensis* Selys, 1879 (A, B, C)

Gomphidae

31. *Gomphidia kirschii* Selys, 1878 (A, B, C) (Figure 10)

The most abundant Anisoptera in the forested habitat explored. This was my first encounter with high density of this species. It is relatively rare in other Philippine islands.



Figure 10:
Gomphidia
kirschii



Hämäläinen & Müller (1997) synonymized *G. kirschii* Selys, 1878 with *G. platerosi* Asahina, 1980 due to lack of true structural difference and the paraproct length is due only to the 'internal' position of this structure. The two clearly differ only in the form of the antehumeral yellow stripe. The Polillo Island population showed no variation on the synthorax markings and resembles *G. kirschii*-form with dorsal stripe not confluent. The paraproct length also showed no variation and clearly fit that of *G. kirschii*-form based on the over 70 specimen netted (majority released).

1♀. – Salipsip, Burdeos, Polillo Island, Philippines April 22, 2009 leg. RJTV

Head. – Labium yellow, mandible yellow darker at the base. Labrum black with paired yellow ovoid spot. Genae yellow, anteclypeus yellow and darkened medially, postclypeus black except for yellowish latero-anterior border. Frons is black except for the interrupted yellow transverse stripe in the ridge at the center that extends to the postfrons. The rest of the head matt is black.

Thorax. – Black with yellow stripes as shown in the figure.

Wings. – Hyaline with traces of yellow in the costal and midbasal space,

Abdomen. – S1 yellow save for the black dorsum, S2 black dorsum with mid-dorsal yellow T-shape streak yellow ventrally, S3-S6 black with paired basal dorsal triangular streak tapering in apical segments, S7 black with paired squarish basal yellow streak, S8 black with almost negligible paired basal yellow line, S9-S10 entirely black.

32. *Heliogomphus* sp. cf. *bakeri* (C)

Two mature males were encountered. Its synthorax marking closely resembles the *H. bakeri* from Mindanao but its superior anal appendage is less robust.

33. *Heliogomphus* sp. (A, B, C)

Four mature males were encountered. Their synthorax marking differs from the description of *H. bakeri* including the superior anal appendage (Asahina, 1980).

Macromiidae

34. *Mac Agriocnemis* f. *femina* (Brauer, 1868) (A, B, D)

35. *Agriocnemis* *pygmea* (Rambur, 1842) (A, B, D)

36. *romia* sp. (C)

Only female of this elusive species was encountered. Comparison with other known congener is required to verify the taxonomic status of this species.



Aeshnidae

37. **Anax guttatus* (Burmeister, 1839)

The record is based on old collection probably obtained around the town proper of Polillo.

38. *Anax* sp. (B, C)

This species was noted flying around an abandoned fishpond. Unfortunately it could not be netted thus it is uncertain if it is the same with the former species.

39. *Gynacantha* sp. (B, C)

The taxonomic state of the island population needs to be clarified. The specimens resemble *G. alcatheae*, *G. constricta* and *G. rolandmuelleri* in the shape of S1-S3 and in the superior anal appendage. They may also be closely related to *G. constricta* and *G. rolandmuelleri* by having a distinct T spot in the frons. The wing venation is more dense than *G. constricta* but sparser than *G. rolandmuelleri*.

40. *Tetracanthagyna bakeri* Champion & Laidlaw, 1928 (C) (Figure 11)

This species was encountered ovipositing on moist decaying logs beside shady spring.

Material. – 1♀

Head. – generally reddish brown except for the blackish anterior 2/3rd of the vertex. Thorax, coxa, trochanter, femur, tibiae including short spines reddish brown except for the blackish joints. S1 dark brown while rest of abdomen blackish.

Wings. – Hyaline as shown in figure.

Measurements. – Hw: 63mm Abd: 55mm



Figure 11:
*Tetracanthagyna
bakeri*



Corduliidae41. *Hemicordulia* sp. (B)

The single male material was relatively larger than *H. mindana* materials from Mindanao. It has a lesser thoracic yellow markings and its genital hamulus is narrower and directed ventrad compared to posteriorly directed *H. mindana*.

Additional material is needed to verify further the taxonomic status of this possible new *Hemicordulia*.

42. *Idionyx salva* Needham & Gyger, 1937 (A, B, C)

This species was described based from a single immature female specimen coming from Laguna, Luzon Island.

43. *Heteronaias heterodoxa* (Selys, 1878) (C, D)

This was relatively uncommon in the island beside the presence of several suitable habitats.

Libellulidae44. *Agrionoptera insignis* (Rambur, 1842) (A, B, D)45. *Brachydiplax c. chalybea* Brauer, 1868 (A, B)46. **Camacinia gigantea* (Brauer, 1867)

The record is based on old collection probably obtained around the town proper of Polillo.

47. *Cratilla lineata assidua* Lieftinck, 1953 (A, B)

This was commonly encountered species in temporary puddles along forest to agricultural trails.

48. *Crocothemis s. servilia* (Drury, 1770) (B)49. *Diplacina bolivari* Selys, 1882 (C)

The island population was relatively low as evidenced by few encounter of this species in just one area from the various areas explored contrary to southern Philippine islands where it is so abundant.

The Polillo Island population was relatively darker. The labrum and mandible was entirely black. The prominent H-mark on the synthorax was obscured with the yellow mark reduced to trapezoid spot near the wing base and ovoid spot just above the spiracle.

50. *Diplacina lisa* Needham & Gyger, 1941 (A, B, C) (Figure 12)

This rare dragonfly was remarkably abundant in Polillo Island. It was encountered often perching on sunlit spot in the shady forest floor. Attempt to find the larva was unsuccessful.





Figure 12: *Diplacina lisa*

51. *Diplacina nana* Brauer, 1868 (A, B, C)

The species shares a similar habitat with the former species. It was less often encountered than *D. lisa*. The Polillo population is relatively darker compared to Cebu, Biliran, Dinagat and Mindanao materials.

52. *Diplacodes trivialis* (Rambur, 1842) (A, B, C, D)

53. *Hydrobasileus croceus* (Brauer, 1867) (B)

54. *Lathrecista asiatica* (Fabricius, 1798) (C)

55. *Neurothemis r. ramburii* (Brauer, 1866) (A, B, C, D)

56. *Neurothemis t. terminata* Ris, 1911 (A, B, C, D)

57. *Orthetrum chrysis* (Selys, 1891) (B)

58. *Orthetrum pruinosum clelia* (Selys, 1878) (A, B, C, D)

59. *Orthetrum t. testaceum* (Burmeister, 1839) (A, B, C, D)

60. *Pantala flavescens* (Fabricius, 1798) (A, B, C, D)

61. *Potamarcha congener* (Rambur, 1842) (B)

This usually common species was relatively uncommon in the island.



62. *Rhyothemis phyllis subphyllis* Selys, 1882 (B)

63. *Rhyothemis regia regia* (Brauer, 1867) (B)

64. *Rhyothemis* sp. cf. *resplendens* (B) (Figure 13)

The species closely resembles *R. resplendens* from Papua New Guinea and northern Australia. However, the hamulus and ventral spines of the cerci of Polillo population differs from those of the Papuan members. The ventral surface of the wings also differs being black instead of brownish.



Figure 13: *Rhyothemis* cf. *resplendens*

Further taxonomic study is needed to verify the taxonomic status of the Polillo population.

65. **Rhodothemis rufa* (Rambur, 1842)

The record is based on old collection probably obtained around the town proper of Polillo.



66. *Tetrathemis i. irregularis* Brauer, 1868 (B, C) (Figure 14)



Figure 14: *Tetrathemis i. irregularis*

- 67. *Tholymis tillarga* (Fabricius, 1798) (B)
- 68. *Zyxomma obtusum* Albarda, 1881 (B)
- 69. *Zyxomma petiolatum* Rambur, 1842 (B)

Discussion

The present species account represents advancement on the Odonata fauna of Polillo Island and for the Philippine archipelago in general. Despite the limited field time and sometimes not so cooperative weather condition, interesting species were discovered, even around settlements. The recent fieldwork thus clearly emphasizes again the need to explore poorly studied sites in the country as many species awaits discovery.

Though some entomologists are working on the entomological fauna in the country including Polillo Island, there is great value of specialists for a particular insect group during such expeditions. Odonata exhibit a wide range of different habitat preferences even between closely related species. Workers not familiar with this may overlook species in the sites explored. This is a significant time



wasted and data loss especially if the overlook species is new to science or an extension of the known range of a restricted species.

Polillo Island fauna is relatively well studied especially vertebrate groups. Active conservation efforts for selected species are also in action. However, the discovery of new species of Odonata shows the unequal state of knowledge for Polillo fauna. This is a gap in systematic and a loophole in conservation biology as this implies that more of the not so novel groups are data deficient.

Though Leviton (1963) stated that Polillo fauna is a mixture of Luzon and east visayan faunal group, the Odonata noted beside being rich in forest specialist is similar to Luzon Island placing it under Luzon faunal region. It has relatively high level of endemics including at least three insular species. This makes the island a local center of speciation not only for vertebrate but also for Odonata.

It is interesting to note that *Vestalis melania* a widely distributed species is absent in sites explored. This large damselfly is always associated in open clear forest streams (Figure 15) and small rivers. The sites explored included areas that are very suitable for the species and can hold a good population. Its absence from these sites suggests possible failure of species radiation to Polillo, a similar situation for *Prodasineura integra* in Babuyan and Batanes group of island (Villanueva, 2009a). Local extinction due to heavy deforestation from logging concessions during the middle of 20th century is also a possibility.



Figure 15: Forest stream



Currently, the eastern part of north-central Luzon is the only known distribution for *Argiolestes realensis* and *A. baltazarae*, the only member of this genus outside Papuan faunal area. The discovery of questionable *Rhyothemis resplendens* provides additional Papuan species extension into the Philippines.

Dinagat, an island of similar size support over 80 species (Villanueva 2009b), thus over 80 species are also expected in the island of Polillo. Species that shows seasonal variation or extremely rare is under represented. For instance members of *Oligoaeshna* and *Chlorogomphus* are expected in the forest river. It just implies that given more field time across season will possibly increase further the 65 recorded species.

The absence of the two previously recorded species is probably an account of chance encounter rather than local extinction. Both species are oriental and widely distributed in the archipelago. Further search will likely reveal this species.

Threat

Polillo Island lacks high mountains and deep gorges which hinder clearing for agricultural purposes. This makes the island at threat to land conversion for agriculture and settlement. During the survey several tracts of forests are cleared for agricultural reasons mainly through 'kaingin'. In some instances clearing extends to the creeks or streams removing vegetations that provide cover for shade loving species.

Deforestation, as always the prime threat to Philippine forest species, is also present in the island. Though logging concessions are no longer a present threat, large number of small scale logging threatens the remaining forest patches. This logging activity was noted during the survey even in the watershed sites.

Although reforestation is being practiced in several areas as evidenced by newly planted seedlings encountered during the fieldwork and per communication with the locals, careful selection of reforestation material should be emphasized. In one site, coconut seedlings are being used as reforestation material in a watershed area (Figure 16). Proper orientation must be given to locals about the need to use indigenous plants for reforestation purposes.

Use of pesticide for collecting crustaceans threatens other aquatic organisms not only on the site it is applied at but, of course, downstream as well. This intentional poisoning of the water system, in addition to the pesticide from agricultural lands, threatens not only livestock and people downstream but the entire aquatic organism. Unfortunately, this practice is rampant not only in Polillo but also in various areas in the country.





Figure 16: Reforestation using coconut

Species of conservation value

Amphicnemis, *Drepanosticta*, *Risiocnemis* and *Teinobasis* are genera listed as threatened due to habitat degradation (Hämäläinen, 2004). Presently, Polillo Island has two species of *Amphicnemis* both probably new to science, three *Drepanosticta* including one new to science and several *Teinobasis* including possible new species to science. Although, the genus *Sulcosticta* is not included in the threatened lists (Hämäläinen, 2004) since it is recently erected (van Tol, 2005) it likely suffers the same threat being a forest specialist.

These species are in need of conservation action as they dependent on forest shade. The restricted range of this species and its preference on forested areas makes them vulnerable to habitat degradation.

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