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Differences in Morphometry and Activity among Tabanid Fly Assemblages in an Andean Tropical Montane Cloud Forest: Indication of Altitudinal Migration?

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ABSTRACT

Evidence suggests that variations along ecological gradients shape organism traits such as behavior or morphometry. We studied the effect of altitude on the flight activity of tropical tabanid fly assemblages of one species of *Stypommisa* Enderlein along a 1 km altitudinal gradient on the northwestern slopes of the Ecuadorian Andes. Our objectives were as follows: (1) to test the hypothesis that highland individuals present larger flight body structures; and (2) to compare the flight activity patterns of flies' assemblages among altitudes and correlate it with weather factors. We sampled specimens in Malaise traps at 1180, 1680 and 2180 m of altitude from 0600 to 1830 h for 20 d at each site. Seven weather variables were measured every hour and flight activity was inferred from relative tabanid fly abundances/hour in traps. We measured morphometrical parameters that included tabanid fly body size, thorax volume, wing area and wing loading. Flight activity patterns revealed a bimodal distribution at 1680 m, and two asynchronous unimodal distributions, one at 1180 and one at 2180 m. GLM analyses revealed that temperature, mist and rainfall were the best predictors of fly activity differences among altitudes. Morphometrical analyses showed that body size and thorax volume increased with increasing altitude. Synchronous groups of flies at different altitudes (those between 1180–$1680_{(pm)}$ m, and $1680_{(am)}$–2180 m) were morphologically similar, suggesting that flies could be capable of migrating from highlands to lowlands at defined hours of the day depending on forest weather conditions.

Abstract in Spanish is available in the online version of this article.

Key words: altitude; Ecuador; flight behavior; Los Cedros; mist; weather variables.

Altitudinal gradients are among the most powerful 'natural experiments' for testing ecological and evolutionary responses of biota to geophysical influences (Körner 2007). There is ample evidence of the effects of altitude on insect morphology, ecophysiology, activity, reproduction, spatial distribution, diversity, and abundance (*e.g.,* Monroy *et al.* 2003, Hodkinson 2005, García-López *et al.* 2011). Some studies have identified that—at the intraspecific level—flight body structures and/or body sizes of insects tend to be larger at lower temperatures (Reeve *et al.* 2000, Gilchrist & Huey 2004), higher latitudes, and higher altitudes (Marcondes *et al.* 1999, Hernández-L. *et al.* 2010). The generality of such patterns at the inter-specific level, however, has been questioned due to evidence of inverse relationships (Mousseau 1997, Brehm & Fiedler 2004). With these arguments in mind, tabanid flies represent an interesting model for studying morphometrics and activity dynamics in the wild. Unlike low vagile organisms such as some geometrid moths and termites which are adapted to live within defined habitats (Brehm *et al.* 2003, Palin *et al.* 2011), tabanid flies possess an extraordinary flight performance (Cooksey & Wright 1987) that allows broader habitat ranges. They are also relatively easy to sample (Brown 2005). Tabanid fly activity, diversity and distribution, have been demonstrated to be highly correlated to weather factors. For example, in tropical and temperate ecosystems researchers found a strong correlation of tabanid fly daily activity patterns with temperature (Pino *et al.* 1973, Ferreira *et al.* 2002). Likewise, diversity studies from Raymond (1979) and Hackenberger *et al.* (2009) found tabanid flies species turnover along altitudinal gradients. The role of weather on the activity patterns of tabanids at different altitudes, however, has never been studied.

Tropical-Andean countries like Ecuador possess different ecosystems along the >5000 m slopes, where each environment is characterized by different and physiologically well adapted plant and animal species (Jørgensen & León-Yánez 1999). In montane habitats this phenomenon is evident at small spatial scales such as ≥ 500 m altitudinal gradients (Celi *et al.* 2004, Küper *et al.* 2004, Cárdenas 2007). The present study evaluates the effect of altitudinal and weather variables on the flight activity and flight-related morphology of a tabanid fly species along a 1-km elevation gradient in an Andean tropical montane cloud forest (TMCF) of northwestern Ecuador. Our objectives were as follows: (1) to assess whether or not high altitude individuals presented stronger and larger flight body structures (as a possible physiological compensation response to the lower temperature and/or lower amount of oxygen available, typical high altitude properties, see Körner 2007); and (2) to describe and correlate the flight activity patterns with weather variations along the altitudinal gradient.

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METHODS

Study area and sampling.—The study area was located in the Bosque Protector Los Cedros, a Chocoan private TMCF encompassing 6000 ha of primary forest in a 1100–2700 m asl range. 'Los Cedros' is situated on the northwestern slope of the Ecuadorian Andes Cordillera in the Imbabura Province (coordinates and altitude of the scientific station: 00°18′ 32″ N, 78°46′ 46″ W, 1350 m asl). The reserve is a southern buffer zone for the 243,000 ha Cotacachi-Cayapas National Park. According to Sierra (1999) the study area includes vegetation formations of low montane evergreen forest (1300–1800 m asl, canopy: 25–30 m) and montane cloud forest (1800–3000 m asl, canopy: 20–25 m). Its topography has 50–70% slope and the average yearly rainfall is about 2700 mm ± 536 (Mejía *et al.* 2005). The pristine conditions of 'Los Cedros' allowed us to examine the influence of altitudinal gradient on tabanid assemblages with no confounding factors related to anthropogenic activities (*e.g.,* cattle farming or wood extraction).

Tabanid fly collection was performed during the dry season (July–October 2005), which is the period of the year with the observed higher abundance and diversity for these insects (Buestán 1980, Desquesnes *et al.* 2005). Three replicate square-designed Malaise traps incorporated with corner baffles were randomly placed 30 m away from each other along a 1-km elevation gradient in three stations (E1, E2 and E3) at 1180, 1680 and 2180 m asl, respectively. In each site the bait consisted of 30 kg of dry ice (2 kg per trap, replaced every 24 h for 5 d) which released about 10 mL of CO_2/min depending on the altitude. Bait efficiency was improved through the respiration of one human (1.65 m height and 60 kg weight) as CO_2 source (about 200 mL of CO_2/min; Raymond 1987, Muirhead-Thomson 1991), and bicolor blue and black cotton fabrics as physical attractants (Allan *et al.* 1987, Sasaki 2001). In total, at each sampling site, there was an approximate total releasing amount of at least 1410 mL of CO_2/min (dry ice releasing + human releasing + fabric releasing effect), an optimal amount to attract tabanid flies (see Roberts 1975). During 20 consecutive days Malaise traps were revised every hour starting at 0600 h and ending at 1830 h, for a total of 250 h of observation per station. Preliminary observations had revealed that tabanids were not captured in Malaise traps during the night hours.

Seven weather variables were measured every hour at each collection site. Minimum and maximum values of temperature (°C) and relative humidity (%) were obtained using a Thermo-Hygrometer (PTH8708 Temperature Humidity Pen, Mannix, New York, NY, U.S.A.), which measures temperature and humidity every 80 sec and calculates min and max values from 45 measurements per hour. Atmospheric pressure (Hg) was measured using a digital barometer (Brunton® Sherpa, Atmospheric Data Center, Riverton, WY, U.S.A.). Rainfall (mm) was measured using a hand-made pluviometer made of a cylindrical graduated plastic-jar (height: 13 cm, diameter: 7.4 cm) and an inverted funnel (diameter: 7.7 cm) glued at the head of the jar to limit evaporation, which was placed in open areas within the forest. Mist presence/absence was assessed by observation where >30 min of mist presence per hour was considered as presence (1) and conversely, >30 min of mist absence per hour was considered as absence (0). Specimens were sacrificed using ethyl-acetate, dry collected and pinned *in situ* to be afterwards deposited at the Invertebrates Section of the Museum of Zoology (QCAZ) of the *Pontificia Universidad Católica del Ecuador* in Quito.

Tabanid fly identification.—Tabanids were sorted in the laboratory by site, date and hour of collection and then identified to generic or specific level. Identification was performed using taxonomic keys and available original descriptions as well as comparisons with type-specimen illustrations (*e.g.,* Wilkerson 1979, Fairchild & Wilkerson 1986, Coscarón & Papavero 1993). Morphological measurements such as frontal and divergence indexes were decisive for final determination. Comparisons with type-material from various Tabanid collections, such as the Natural History Museum of Paris, and online posted material from the Museum of the California Academy of Sciences (http://research.calacademy.org/research/entomology/typesdb/default.asp) and the Museum of Comparative Zoology (http://insects.oeb.harvard.edu/MCZ/index.htm), were helpful to confirm the identification of several species. A detailed taxonomic discussion of 'Los Cedros' tabanid flies and full taxonomic bibliography is given in Cárdenas (2007). Taxonomic determination was confirmed by A. L. Henriques at the Instituto Nacional de Pesquisas da Amazônia (INPA, Manaus, Brazil; *in litt.*, and see Appendix S1, Tables S1–S3 for further details).

Statistical analyses.—Only three of all tabanid species found in our survey (*Scione* aff. *flavescens*, *Stypommisa lerida* and *Stypommisa* sp. *pequeniensis* group, *sensu* Fairchild & Wilkerson 1986, hereafter named *Stypommisa* sp.) were sampled at the three altitudes. Among these three species only *Stypommisa* sp. was found in sufficient numbers for analyses (see Table 1). All analyses were performed using exclusively female specimens, since out of the 5629 individuals of this species collected during our survey only one was male.

Morphometric analyses.—Of the 214 flies collected at the lower elevation site, only 50 had wings in conditions good enough to obtain sufficient data for the morphometric analyses of *Stypommisa* sp. assemblages between different altitudes. For each of the other elevations surveyed, 50 specimens were chosen randomly to run these analyses. Body size (BS), thorax volume (TV), wing area (WA), and wing loading (WL) were measured for comparisons between specimens along the altitudinal gradient.

Body size and thorax volume: Altitude conditions challenge flight performance in insects (Dillon & Frazier 2006), and physiological compensations such as the increase or decrease of the dimensions of body structures related to flight have been documented in insects at high elevations (Marcondes *et al.* 1999, Hodkinson 2005, Hernández-L. *et al.* 2010). Among these flight-

TABLE 1. *Abundance of all species sampled at the three study sites in the 'Bosque Protector Los Cedros'.*

Species	1180 m	1680 m	2180 m	Total
Stypommisa sp. (*pequeniensis* group, n.sp.?)	214	3370	860	4444
Tabanus thiemeanus	436	297	0	733
Scione aff. *flavescens*	30	138	1	169
Stypommisa lerida	15	94	20	129
Dasychela ocellus	0	4	48	52
Tabanus sp. 1	9	28	2	39
Esenbeckia testaceiventris	3	17	0	20
Dicladocera argenteomaculata	7	0	0	7
Esenbeckia aff. *nigriventris* (n.sp.?)	0	7	0	7
Dichelacera (*D.*) aff. *hartmanni* (n.sp.?)	6	0	0	6
Scione sp. 3	1	2	2	5
Dicladocera pruinosa	0	2	2	4
Dicladocera clara	3	0	0	3
Bolbodimyia bicolor	2	0	0	2
Diachlorini sp. (n. gen.?)	0	0	1	1
Dicladocera sp. 1 (n.sp.?)	0	1	0	1
Dicladocera sp. 2 (n.sp.?)	1	0	0	1
Dicladocera sp. 3 (n.sp.?)	1	0	0	1
Fidena rhinophora	1	0	0	1
Scaptia aureopygia	0	1	0	1
Scione brevibeccus	0	0	1	1
Tabanus sp. 2	1	0	0	1
Tabanus sp. 3	1	0	0	1
N	731	3961	937	5629
S	16	12	9	23

S = total number of species; *N* = total number of individuals.

related structures are BS and TV. BS calculation corresponded to the measure of the lateral view body size (length in mm) from the head frontal callus to the VII abdominal segment (McAlpine 1981, see Fig. S1A). TV (in mm^3) was calculated as the product of thorax width, length and height (Katzourakis *et al.* 2001; see Fig. S1A, B). Note that as TV was a cuboid estimation, obtained values were only an approximation of TV.

Wing area: The calculation of wing area was complicated by the natural use-damage in some wing margins as well as alula and anal lobes found in a few tabanid fly specimens. A way around this was to use a computed-morphometric methodology that uses landmarks (points) homologous to all the study-subjects, thus allowing for the calculation of homologous work-spaces (Rohlf & Marcus 1993). Wings of adult female flies were separated from the body at the base and placed in a Petri dish containing 90 percent ethanol. Photographs of each wing were taken using a Canon Powershot S40 digital camera (Canon Inc., Tokyo, Japan) attached to a stereomicroscope (Leica $M27_5$, Leica Microsystems AG, Wetzlar, Germany) over a millimeter grid background for size reference. Images were stored as high resolution JPEG files. Following Zelditch *et al.* (2004) all landmarks were selected on the criteria of homology and comprehensive coverage. Vein-vein landmarks were set at the intersection of Media (M) and anterior branch of media (MA), while vein-edge intersection landmarks were set at subcosta (Sc), posterior branches of radius (R_2 [R_{2+3}]), (R_4 [R_{3+4}]), R_5, posterior branch of media (M3) and anterior branch of cubitus ($Cu_2 + A_1$; McAlpine 1981, Bookstein 1991, Fig. S1B). Landmarks were identified on each wing and their coordinates obtained using tpsDig 2.10 (Rohlf 2006). Wing area was calculated automatically using the tpsUtil 1.43 application (Rohlf 2008).

Wing loading: It is defined as the pressure exerted by the wings on the surrounding air (Gilchrist & Huey 2004). Given that low temperatures have negative effects on the wing beat frequency of some ectotherm animals like *Drosophila* (Unwin & Corbet 1984), it is expected that flying insects adapted to highlands compensate for these effects by reducing wing loading (formally abbreviated ρ_w), thus allowing improved performance and speed of flight at low temperatures. It is generally calculated in mg/cm^2 (*e.g.,* Bartholomew & Heinrich 1973) using the wet mass of insects (mg) and the wing area (cm^2). Due to the lack of fresh body weight measures of museum specimens we assumed WL values based on the formula WL = BV/WA expressed in mm^3/mm^2, where BV (in mm^3) represents body volume (in a cuboid form), and was calculated as the product of thorax width, thorax height and body length (Fig. S1A, B).

CLASSIFICATION ANALYSES.—We performed a Canonical Discriminant Analysis (CDA) to test multivariate differences among tabanid flies' assemblages (altitudinal groups as *a priori* categories), and to identify which of the measured body-structures contributed most to group separation. CDA is used to generate linear combinations of the variables that maximize the differences among groups (Gotelli & Ellison 2004). Our distribution analyses of tabanid abundance data for 1680 m revealed a significant bimodal frequency distribution along the day—two distinct peaks of fly activity—one in the morning and one in the afternoon (statistical analysis described below). This led us to distinguish the 1680 m individuals into two sub-assemblages, namely 1680 $m_{(am)}$ (0800–1100 h) and 1680 $m_{(pm)}$ (1300–1800 h) to reveal any similarities between them and the 1180 m and 2180 m assemblages. The four variables to describe were the BS, TV, WA and the WL. The Wilk's lambda test was used to assess whether the statistical significance of the differences explained by the discriminant variables, and only statistically significant discriminating variables, were retained for the explanation of the results. In addition, differences in morphological variables among the three sampling sites of the gradient were analyzed with Kruskal Wallis nonparametric test and Mann Whitney pairwise comparisons as *post-hoc*, using PAST statistic package ver. 2.07 (Hammer *et al.* 2001; *i.e.,* previous analyses showed that Levene test for homogeneity of variances were significant [$P < 0.01$; except for BS and WA] and residuals showed to be no normal [$P < 0.01$; except for BS and WA]). The software used computes the H_c statistic, and the P-value is approximated from H_c using the chi-square distribution.

TABANID FLY DAILY ACTIVITY PATTERNS.—Flight activity was inferred from *Stypommisa* sp. relative abundance in Malaise traps.

Several Tabanidae species, especially in tropical latitudes, show bimodal peaks of abundance during the day (Desquesnes *et al.* 2005). Such activity patterns require adapted statistical methods to determine the mixture of abundance distributions. Accordingly, we decomposed frequency distributions of tabanid fly catches into Gaussian distributions using a combination of a Newton-type method and expectation maximization algorithms (Leish 2004). The distribution of fly catches x was represented by a finite probability density function g(x) of the form:

$$g(x) = \pi_1 f_1(x) + \ldots + \pi_k f_k(x), \quad (1)$$

where $0 \leq \pi_i \leq 1$, $i = 1, \ldots, k$; $\pi_1 + \ldots + \pi_k = 1$. The parameters $\pi_1, \ldots, \pi_k$ are the mixing proportions and $f_1(\cdot)\ldots f_k(\cdot)$ the component densities of the mixture. Mean (μ_n), variance (σ_n), and proportion (π_n), for each n component distributions were calculated using the 'mixture distribution' package of R software (R Development core team 2010). A χ^2 function was used for parameter estimations and goodness-of fit testing when adjusting curves to histograms.

In addition, we assessed changes of activity patterns of the species between collecting sites (frequency per hour) using χ^2 analysis. For this purpose we performed a matrix of the accumulated data of the percentage of individuals collected per hour (rows), using $x + 1$ transformed data to elude zero values. Analysis was performed with PAST statistic package ver. 2.07 (Hammer *et al.* 2001) using the 'one constraint' method, as suggested by the user's manual for when analyzing frequency percentages. We further used Monte Carlo estimates to calculate *P*-values.

Tabanid fly abundance and weather variables.—We ran general linear model (GLM) analyses within each station to assess which of the variables was contributing the most to the predictions of species distributions. This helped us test the potential dependency of species activity on weather factors along the altitudinal gradient, using a 'time-series'-like matrix computed as dependent and independent variables in columns and hours per day in rows. We used log-transformed data of the abundance dependent variable. Temperature (min/max), humidity (min/max), atmospheric pressure and rainfall covariates were normalized using $(x - \bar{x})/SD$ formula (Sokal & Rholf 1994) to avoid particular variances due to different metric-scales. Mist was analyzed as categorical data of presence (1)/absence (0) in the same time-series matrix. We performed a model using all the predictors (covariates) together and all their possible interactions to evaluate combined contributions and set a full model adjusted R^2. Contributions of more than three predictor interactions were not taken into account for interpretations. GLM was performed using SPSS 17.0 (SPSS Inc., Chicago, IL, U.S.A) using Type III sum of squares.

RESULTS

Tabanid flies communities.—A total of 23 species of tabanid flies belonging to 11 genera and two sub-families (Pangoniinae and Tabaninae) were captured at the three elevations surveyed. Of these, 11 species were identified to the specific level, 9 of all sampled species were singletons and one species was a doubleton (Table 1). *Stypommisa* sp. was found all along the gradient and represented 78.9 percent of the total collection (29.3% at 1180 m, 85.1% at 1680 m, and 91.8% at 2180 m, Table 1).

Altitudinal variations in morphometric analyses.—Predictor variables were body size (BS), thorax volume (TV), wing area (WA) and wing loading (WL). We found that the analysis was mainly based on the first function, which explained the 94 percent of the total variation. Although all the variables resulted significant in the Wilks's Lambda test, both the BS and the WL showed to be the best predictors in the first function ($P < 0.001$; $F_3 = 31.2$ and $F_3 = 15.4$ respectively; Table 2A). Figure 1 illustrates that the 1180 and 2180 m assemblages differed morphometrically. The CDA correctly classified 78 percent of the 1180 m individuals and only 6 percent were associated to the 2180 m group (Table 2B). On the other hand, 50 percent of the 2180 m individuals were correctly classified and only 2 percent of individuals were associated to the 1180 m group (Table 2B). In other words, the 1680 and 2180 m individuals were more difficult to discriminate (Fig. 1). Table 2B shows that 39.1 percent of the 1680 $m_{(am)}$ individuals were classified in the 2180 m group. A previous CDA using the three altitudes as categories (*i.e.,* without separating the 1680 m asynchronous individuals) showed that 32 percent of the 2180 m individuals were classified in the 1680 m group, and

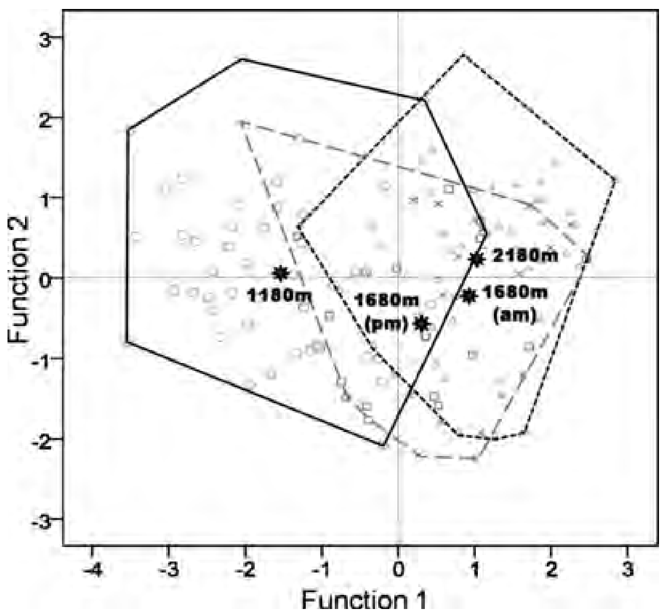

FIGURE 1. Canonical discriminant analysis (CDA) of the four tabanid fly assemblages based on flight structures morphometrics. Solid-black and short-dashed black polygons represent the 1180 m (circles) and 2180 m (triangles) assemblages' distributions respectively. For easier lecture, the whole 1680 m (crosses: 1680 $m_{(am)}$; squares: 1680 $m_{(pm)}$) assemblage distribution was represented by a single long-dashed gray polygon. Black gear symbols correspond to groups centroids.

TABLE 2. *Results of the canonical discriminant analysis (CDA) showing (A) the discriminative weight of the morphometrical parameters using the Wilks' Lambda statistic, and (B) the* a priori *group classification test.*

		Tests of equality of group means			
A	Wilks' Lambda	F	df1	df2	P
BS	.591	31.181	3	135	<0.001
TV	.775	13.047	3	135	<0.001
WA	.930	3.386	3	135	0.020
WL	.745	15.380	3	135	<0.001

Classification results

B		Predicted group membership (%)			
Site	1180 m	1680 $m_{(pm)}$	1680 $m_{(am)}$	2180 m	Total
1180 m	78.0	14.0	2.0	6.0	100.0
1680 $m_{(pm)}$	12.5	43.8	18.8	25.0	100.0
1680 $m_{(am)}$	4.3	30.4	26.1	39.1	100.0
2180 m	2.0	26.0	22.0	50.0	100.0

43.6 percent of the 1680 m individuals were classified in the 2180 m group (results not shown).

Figure 2 (A–D) illustrates the Kruskal Wallis *post-hoc* results of the different morphometrical parameters for each of the four *a priori* assemblages along the altitudinal gradient. We found significant differences of all the morphometrical parameters between the 1180 and the 2180 m assemblages: BS (H_c = 58.5; P < 0.001), TV (H_c = 30.5; P < 0.001), WA (H_c = 10.2; P = 0.017). Surprisingly, WL (H_c = 35.0; P < 0.001) increased with increasing altitudes. Although there were no significant differences between the 1680 $m_{(am)}$ and 1680 $m_{(pm)}$ groups of tabanid flies it is worth noting the similarities of the means of the 1180–1680 $m_{(pm)}$ and 2180–1680 $m_{(am)}$ groups of flies, which are the ones that showed analogous flights patterns (Fig. 3). Complete morphometric raw data can be found in Table S4.

FLIGHT ACTIVITY PATTERNS.—At 1180 m *Stypommisa* sp. presented an unimodal distribution of flight activity along the day with a peak between 1600 and 1800 h that abruptly decreased at dusk (Table 3, Fig. 3A). At 1680 m, we found a significant bimodal distribution of the activity with a main peak between 0900 and 1200 h and a minor peak between 1500 and 1800 h (Table 3,

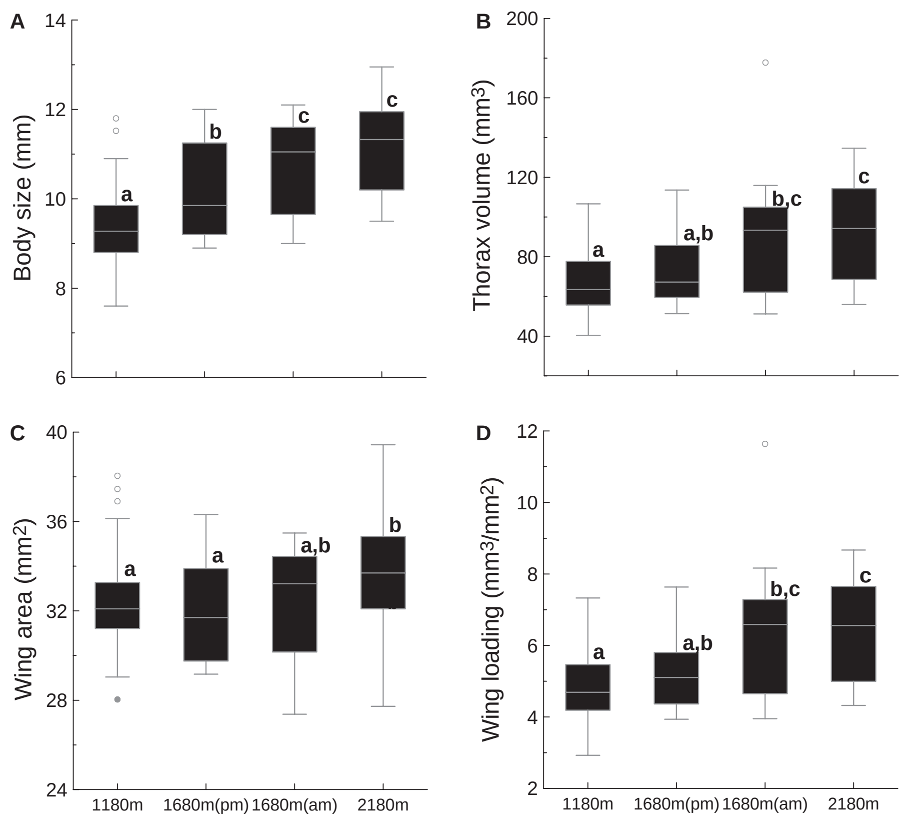

FIGURE 2. Box plots of *Stypommisa* sp. representing body size (A), thorax volume (B), wing area (C) and wing loading (D) variations along the altitudinal gradient. Circle symbols represent outliers. 1680 $m_{(am)}$ enclosed insects flying between 0800–1100 h, and 1680 $m_{(pm)}$ to insects flying between 1300–1800 h. Mann Whitney *post-hoc* (Kruskal Wallis test) mean differences significance are denoted using *a*, *b*, and *c* nomenclature. BS (H_c = 58.5; P < 0.001), TV (H_c = 30.5; P < 0.001), WA (H_c = 10.2; P = 0.02) and WL (H_c = 35.0; P < 0.001) increased while increasing altitude.

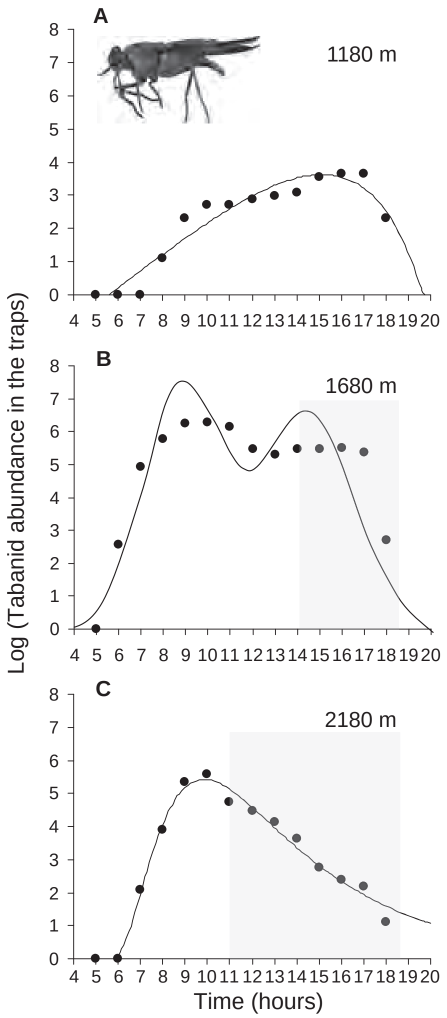

FIGURE 3. Activity patterns of *Stypommisa* sp. during the day based on relative abundance frequency per hour along the elevational gradient. Abundance data were fitted using Gaussian models curves. Rectangular shade represents the hours of the day when regularly mist was present in 'Los Cedros' cloud forest at different altitudes.

TABLE 3. *Abundance-frequency additive normal distributions of tabanid flies' assemblages at three different altitudes.*

	Altitudinal tabanid flies assemblage abundance mixture distribution		
	1180 m	1680 m	2180 m
n	214	3370	860
μ_1	13.094	9.297	11.257
σ_1	3.025	1.264	2.959
π_1	1	0.685	1
μ_2	–	14.339	–
σ_2	–	1.740	–
π_2	–	0.315	–
χ^2_{11}	4.182	1.798	6.218
P	0.964	0.876	0.858

μ_n is the mean, σ_n the variance, and π_n the proportion of tabanid flies for each of the n distributions making up the mixture distribution. Tabanid flies flight activity showed a bimodal mixture distribution at 1680 m. Parameter estimations and goodness-of-fit are given by the χ^2 and P-values.

Fig. 3B). Finally at 2180 m (Table 3, Fig. 3C), the species showed a unimodal activity with a peak at 1000–1100 h that decreased after 1100 h. χ^2_{13} test of frequency patterns within species among sites showed significant differences on the activity of the species along the gradient between 1180 and 1680 m ($\chi^2_{13} = 35.4$, $P < 0.001$; Monte Carlo $P < 0.01$) and 1180–2180 m ($\chi^2_{13} = 74.2$, $P < 0.001$; Monte Carlo $P < 0.01$), but not between 1680 and 2180 m ($\chi^2_{13} = 19.2$, $P = 0.12$; Monte Carlo $P = 0.07$).

Fly activity in relation to weather.—General linear model analyses of the full model (seven factors and their interactions) found that temperature, mist, and rainfall were the best predictors of *Stypommisa* sp. abundances along the gradient (Table 4). At 1180 m only maximum temperature affected tabanids' abundances ($F_1 = 3.75$, $P = 0.054$). At 1680 m and 2180 m abundances were significantly affected by rainfall (1680 m: $F_1 = 8.683$, $P = 0.004$; 2180 m: $F_1 = 3.787$, $P = 0.053$), minimum temperature (1680 m: $F_1 = 18.984$, $P < 0.001$; 2180 m: $F_1 = 40.682$, $P < 0.001$), as well as by the interaction between minimum and maximum temperatures (1680 m: $F_1 = 11.442$, $P = 0.001$; 2180 m: $F_1 = 13.816$, $P < 0.001$), and rainfall and mist interaction (1680 m: $F_1 = 14.308$, $P < 0.001$; 2180 m: $F_1 = 3.912$, $P = 0.049$). At 2180 m mist *per se* played an important role in tabanids' abundances ($F_1 = 34.391$, $P < 0.001$). Note that, when occurring, mist was generally present from 1400 h at 1680 m and from 1100 h at 2180 m. The lower limit of the mist was around 1300–1400 m. Adjusted R^2 of the total regression model fits strongly at 1680 m (0.636) and 2180 m (0.717), but at 1180 m (0.178) the fit was weak. Complete raw data for flies' abundance and weather variables measurements can be found in Table S5.

DISCUSSION

Morphometric changes along the altitudinal gradient.—One hypothesis of our study was that individuals found at higher altitude present larger and stronger flight body structures to—presumably—compensate altitudinal effects and hence improve or at least keep flight performance level (Gilchrist & Huey 2004, Dillon & Frazier 2006). Our results showed morphological changes at a 1-km elevation gradient; similar morphological variation within a short altitudinal gradient in the Ecuadorian Andes has also been reported for moths, suggesting flight structure adaptations to altitude in a <1-km gradient (see Hernández-L. *et al.* 2010). The increases in BS, BV (not shown) and TV found in this study would represent an advantage under conditions combining lower air pressure and temperatures (Dillon & Frazier

TABLE 4. *General linear model showing ANOVA of the abundance-dependent variables per hour per site. Mist variable was not included in E1 as it never reached this site during the study.*

Altitude	Predictor	Full model adjusted R^2	df	Mean square	Partial eta squared	F	P
E1 1180 m	T_{max}	0.178	1	0.254	0.019	3.750	0.054
E2 1680 m	T_{min}	0.636	1	1.871	0.082	18.984	<0.001
	$T_{min} \times T_{max}$		1	1.127	0.051	11.442	0.001
	Rainfall		1	0.856	0.039	8.683	0.004
	Rainfall × mist		1	1.410	0.063	14.308	<0.001
E3 2180 m	T_{min}	0.717	1	2.459	0.157	40.682	<0.001
	$T_{min} \times T_{max}$		1	0.835	0.059	13.816	<0.001
	Rainfall		1	0.229	0.017	3.787	0.053
	Mist		1	2.079	0.136	34.391	<0.001
	Rainfall × mist		1	0.236	0.018	3.912	0.049

2006, Körner 2007). Since metabolic rates are positively correlated with body size and negatively correlated with temperature in nature (Gillooly *et al.* 2001), increase in BS with altitude may be an adaptation to lower temperatures in the highlands in order to regulate metabolism. Increase in TV represents an increment in muscular mass that would permit insects have higher levels of flight acceleration capacity and performance (Berwaerts *et al.* 2002, Dillon *et al.* 2006) at altitude, which can be critical for the survival of hematophagous insects. Reduction of the overall WL has been proposed as a physical compensation to altitude (Gilchrist & Huey 2004, Dillon *et al.* 2006). Body mass reduction (BV in our case) and/or increasing of wing area (WA) could both lead to WL reduction. Unexpectedly, we found higher WL values for individuals living at higher altitude. This was due to the fact that increase in BV at higher altitude (results not shown) was more pronounced than that of WA. We finally suggest that the increase of TV might be sufficient to compensate the augmented WL in higher altitudes to maintain flight motility performance. Although size compensation to altitude in TV might be critical when seeking and competing for common resources—such as mammals blood—additional experiments are needed to assess whether increased TV is associated or not with flight activity and positively correlated with tabanid fly fitness and performance (see Reeve *et al.* 2000, Berwaerts *et al.* 2002).

FLIGHT ACTIVITY: ASSESSING THE ROLE OF BIOTIC AND ABIOTIC CONTROL.—Our study was focused on *Stypommisa* sp., a tabanid fly common along the altitudinal gradient surveyed, and aimed to determine the presence of any changes on its activity during the day and morphological responses to altitude. We found a remarkable variation on daily flight activity along the gradient: unimodal right-skewed at the lower elevation (1180 m), bimodal at the mid-elevation (1680 m), and unimodal left-skewed at the higher elevation (2180 m). Both biotic and abiotic factors may be controlling species abundance distributions throughout the day. Some of the most representative biotical factors are competition-parasitism-predation and host range area-resources availability (Carothers & Jaksić 1984, Hodkinson 2005, Kubota *et al.* 2007, Kumar *et al.* 2009). Of these factors, parasitism was not taken into account for this study, and it is now impossible to obtain and incorporate data for predation and hosts range areas-resources availability for our surveys. Be as it may, additional competition analyses based on niche overlap null models (see Table S6) showed that *Stypommisa* sp. never partitioned hours of activity with any other common species *in situ* (Czekanowski indexes of the expected distributions 'without' competition, Appendix S2, Table S6). It would be erroneous to assume that the use of dry ice and human bait resulted in the partition of resources (Carothers & Jaksić 1984), especially since tabanids were captured in traps and would not have had enough time to develop any particular behavior during the study time. We therefore suggest that competition is not an interfering-factor affecting *Stypommisa* sp. abundance distribution along the day, and that this species must be adapted to fly at particular periods of time when its own metabolic performance is 'optimal' (see Carothers & Jaksić 1984).

General linear model analyses suggest that temperature, mist, and rainfall would be critical variables for predicting tabanid flight activity in tropical cloud forests. As proposed by former studies (*e.g.,* Pino *et al.* 1973, Ferreira *et al.* 2002), higher temperatures, mist absence and low rainfall are generally related to greater fly abundance. Fly abundance data, however, did not match perfectly with higher values of temperature (found generally around noon) and lower values of mist and rainfall (generally occurring in the morning and noon). This suggests that other factors such as light levels (Harley 1965, McElligott & Galloway 1991), air pressure (Alverson & Noblet 1977), and low rates of relative humidity (Pino *et al.* 1973, Alverson & Noblet 1977, Ferreira *et al.* 2002, Oliveira *et al.* 2007) might also affect tabanid flight activity. We hypothesize that flies might be disposed to fly downhill to avoid mist and the physiological constraints it may represent for them. Mist generally implies lower temperatures and higher humidity (Pino *et al.* 1973, Oliveira *et al.* 2007), all of which have a negative effect on tabanid fly activity.

CONCLUDING REMARKS: COULD FLIES PERFORM ALTITUDINAL MIGRATION?—A puzzling result of our study was the presence of two morphologically-separated populations of *Stypommisa* sp. tabanid flies at the intermediate elevation site. The morphological similarity of these two populations with flies from higher and lower altitudes led us to the hypothesis of potential altitudinal migration. Our argument is that flies would tend to avoid mist by generally flying downhill, for the reasons mentioned above. Although we are aware that our study provides neither the evidence for actual migration nor an explanation as to how such a migration—of 500 m of elevation—would be energetically sustainable for flies, the strong flight capacity of tabanids (*e.g.,* 2.4 km in 1–2 d, see Cooksey & Wright 1987, see also Bonhag 1949) and the evidence of altitudinal migration in other tropical forest animals (Loiselle & Blake 1991, Chaves-Campos *et al.* 2003, Hobson *et al.* 2003, Fraser *et al.* 2010) suggest that our hypothesis would be worth testing in the future. A potential approach could involve the use of stable isotopes (δD, δ13C) to track and confirm altitudinal movement, as suggested by Hobson *et al.* (2003), but on a smaller spatial scale.

If migration for avoiding 'bad' weather conditions is confirmed, the importance of this study would extend beyond just the observation and study of tabanid fly behavior. On a broader context, understanding the *whys* behind the changes of activity patterns in tabanids can prove vital when assessing the potential effects of disruptions due to global warming on the survival of mammals not yet affected by the illnesses carried by these flies (*i. e.,* mammals living in low-activity tabanid fly altitudes; see Foil 1989), as well as on the ecology and persistence of tabanid fly pollinated plants.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

APPENDIX S1. Justification of the Stypommisa sp. specimens' identity found the long of the altitudinal gradient at "Los Cedros".

APPENDIX S2. Czekanowski niche overlap index and null models analyses using EcoSim.

TABLE S1. *Los Cedros Stypommisa sp.* (n_{total} *= 143) morphometrical traits classically used in tabanid species descriptions (e.g., Fairchild & Wilkerson* 1986).

TABLE S2. *P-values of the t-tests comparing E1, E2 and E3 assemblages' morphometrical parameters.*

TABLE S3. *Frontal indexes and body sizes comparisons between Los Cedros Stypommisa sp. (bold) and other morphologically similar species in literature.*

TABLE S4. *Data on randomly chosen specimens for morphometric body-flight analysis.*

TABLE S5. *Total abundance data (n) and weather variables per day, hour and site of collection (altitude).*

TABLE S6. *Simulated and observed niche overlap Czekanowski indexes using RA2 algorithm in EcoSim, v. 7.72.*

FIGURE S1. *Parameters used for the calculation of body morphometrics.*

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APPENDIX S1. *Justification of the Stypommisa sp. (pequeniensis group) specimens' identity found the long of the altitudinal gradient at "Los Cedros".*

Specimens from every altitude sampled fit well with the key proposed by Fairchild & Wilkerson (1986) that leads to *kroeberi*. However, they disagree in three aspects of the description: (1) in *kroeberi* antennae are orange-yellow where only the apex of the last ring style is black, while in the specimens studied the whole style is enfuscated and covers the apex (and sometimes up to ¾) of the basal plate; (2) *kroeberi* presents a FI = 5.4 (5.1 to 5.9, *n* = 9) while those collected in the study area have a FI = 4.49 (3.60 to 5.55, *n* = 250) (3) *kroeberi* presents a DI = 1.4 (1.2 to 1.6, *n* = 9) while the specimens collected have a DI = 1.08 (0.86 to 1.31, *n* = 250). Although the holotype of *kroeberi* must be deposited in the MCZ, neither its photograph nor data collection could be found on the website of the Museum, so it was not possible to confront our specimens with any identified specimen. According to the authors, *venosa*, *spilota* and *changena* could represent geographic forms of a unique species, reason why we need to compare our specimens to these three forms. Because of the difficulty of the group, Fairchild & Wilkerson (1986) did not include *venosa* in their key, and they argue that it is quite possible that many individuals of this species agree with the key that leads to *kroeberi*. For morphometrical comparisons with other similar species, please refer to Table S3.

Comparison with *venosa*: differentiation from this species was more complicated as there are no published morphometric indices, so comparisons at this level were not possible. Morphologically, as described in Fairchild & Wilkerson (1986), *venosa* seems to differ from "Los Cedros" specimens in the following characters: (1) Spots of transverse veins of the basal cells in *venosa* are not as prominent as those of the specimens collected (refer to Fig. 71 in Fairchild & Wilkerson 1986). (2) *venosa* presents a reddish-brown pollinose frons and sub-callus, while those collected in "Los Cedros" are yellowish-brown pollinose. (3) In *venosa*, the palps are light-brown, while the studied specimens present light brown grayish-pollinose palps. (4) The palpal hairs on the base of 2nd segment are brownish yellow in *venosa*, but brown in the studied specimens. *venosa* mesonotum is described as reddish-brown while "Los Cedros" ones are brown. (5) In *venosa*, costal cell and stigma are orange and yellow respectively, but not in the studied specimens where both are concolorous yellow-orange. (6) When compared to the single *venosa* specimen identified in the QCAZ Museum, we noticed differences in the color and hairiness of the front femora, which are darker and longer in those captured in "Los Cedros". (7) When looking at the wings, “Los Cedros” specimens present darker spots, and veins with longitudinal clouds which are absent in the QCAZ specimen.

Comparison with *spilota*: (1) this species seems to be relatively larger (12 mm vs. 10.3mm of “Los Cedros” specimens). (2) *spilota* antennae style is just slightly dark, compared to the studied specimens whose style are fully enfuscated and covers the apex (and sometimes up to ¾) of the basal plate. (3) In *spilota*, mesonotum and scutellum are completely black, compared to dark-to-light brown mesonotum and scutellum in “Los Cedros” specimens. (4) in *spilota* transversal veins of basal cells are spotless.

Comparison with *changena*: (1) this species is as dark as *lerida*, but with scutellum wholly blackish. (2) *changena* eyes present a transversal purple band, totally absent in “Los Cedros” specimens.

As body size and wing length could differ as a physiological response to altitude, *t*-tests were performed to compare Frontal and Divergence Indexes (FI vs. DI). Results are summarized in Table S3 where it is shown that there are no significant differences in these taxonomical parameters

APPENDIX S2. *Czekanowski niche overlap index and null models analyses using EcoSim*

We used null model analyses to examine the temporal overlap of common species at each site and test for competition effect on the activity patterns of *Stypommisa* sp. Niche overlap indices are sensitive to the number of species and niche categories compared (Feinsinger *et al*. 1981), which is why we decided to include all common species on every model (n > 20). Following Lawlor (1980) we use time of activity (hours) as a resource for measuring overlapping of the tabanid flies' activity setting abundances in percentages. We constructed three matrices with species abundances as rows (E1: S=4; E2: S=5; E3: S=3 species) and hours of day as columns (n = 14). We used the Czekanowski symmetrical index (Feinsinger *et al*. 1981) to measure the overlapping histogram area of temporal niche use of species. It ranges from 0 (no overlap) to 1 (full overlap) and is calculated for each unique species pair in the assemblage (pairwise tables, see Table S6). Species are found to share the time of day when the observed Czekanowski index is smaller than expected by chance (generated from the null assemblages). Randomizations were done using niche overlap model in EcoSim, version 7.72 (Gotelli & Entsminger 2009). We used Randomization Algorithm 2 (RA2) which retains zero values and relaxes niche breadths. The zero-values-retaining means that if a species never occurred naturally during a specific time period, it would not occur in the randomized assemblage either (Winemiller & Pianka 1990). On the other hand, niche breadth relaxing replaces the observed resource utilization (abundances) by a uniform 0-1 value, making equiprobable all the utilization levels for any resource and eliminating any degree of specialization. RA2 is recommended when some resource is unavailable for some species (*e.g.* when physiological constraints prevent activity during cold and/or humid times of the day) but there are no other constraints on resource use (Gotelli & Entsminger 2009). Resources (hours) were set as equiprobable, assuming to be equally available to all species supposing null species interactions. The average pairwise observed niche overlap between *Stypommisa* sp. and congeneric *Stypommisa lerida* was compared to the average calculated for the randomized analysis of both species in isolation, using the same methodology described above.

Czekanowski indexes of the expected distributions “without” competition resulted smaller than those observed in all of the three collecting sites. *Stypommisa* spp. observed niche overlap indexes resulted larger than those simulated in isolation as well (Table S6). The possibility that competition could be affecting *Stypommisa* sp. flight patterns is, for now, discarded.

TABLE S1. *Los Cedros* Stypommisa *sp.* (n$_{total}$ *= 143) morphometrical traits classically used in tabanid species descriptions (*e.g. *Fairchild & Wilkerson 1986). Body size was measured from the head frontal callus to the VII abdominal segment. Wing length was the distance from the wing base to the wing tip. Frontal index corresponds to the frons height over the frons basal width. Divergence index corresponds to the vertex width over the frons basal width.*

		Min	Max	Mean ± SD
	Body size (mm)	7.60	11.80	9.43 ± 0.81
	Wing length (mm)	8.80	12.00	10.41 ± 0.73
E1 (1180m)	Frontal index	4.06	5.54	4.65 ± 0.3
n = 49	Divergence index	1.09	1.5	1.29 ± 0.1
	Body size (mm)	8.90	12.45	10.59 ± 1.03
E2 (1680m)	Wing length (mm)	9.40	12.40	11.01 ± 0.87
n = 44	Frontal index	4.10	5.19	4.64 ± 0.25
	Divergence index	1.13	1.43	1.25 ± 0.07
	Body size (mm)	9.50	12.95	11.12 ± 0.96
E3 (2180m)	Wing length (mm)	9.90	12.7	11.35 ± 0.84
n = 50	Frontal index	4.00	5.27	4.73 ± 0.25
	Divergence index	1.07	1.53	1.27 ± 0.1

TABLE S2. P *values of the* t-*tests comparing E1, E2 and E3 assemblages' morphometrical parameters. Lower left side of the table corresponds to Frontal Index, and upper right side of the table to Divergence Index.*

	E1 (1180m)	E2 (1680m)	E3 (2180m)
E1 (1180m)		*P* = 0.06	*P* = 0.728
E2 (1680m)	*P* = 0.886		*P* = 0.137
E3 (2180m)	*P* = 0.123	*P* = 0.07	

TABLE S3. *Frontal indexes and body sizes comparisons between Los Cedros* Stypommisa *sp. (bold) and other morphologically similar species in literature. No comparable data was available for other morphological parameters, or for similar species* Stypommisa flavescens *and* Stypommisa venosa*.*

Species	Frontal index $\bar{x}$ ± SD (min–max) if available	*n*	Body size $\bar{x}$ ± SD (min–max) if available	*n*	Reference
***Stypommisa* sp.**	**4.67 ± 0.28 (4.00–5.54)**	**142**	**10.38 ± 1.17 (7.50–12.50)**	**150**	
-*pequeniensis* group-					
Stypommisa pequeniensis	6.8 (5.6–8.4)	20	10.9 (10–12)	20	Wilkerson (1979)
Stypommisa captiroptera	5.7 (5–6.2)	23	11.8 (10–13)	23	Wilkerson (1979)
Stypommisa glandicolor	(6–9.3)	121	(8–12)	121	Fairchild & Wilkerson (1986)
-other morphological similar species-					
Stypommisa kroeberi	5.4 (5.1–5.9)	9	11.5	1	Fairchild & Wilkerson (1986)
Stypommisa changena	6.0 (5.3–6.2)	8	*not available*	-	Fairchild & Wilkerson (1986)
Stypommisa spilota	6.3 (5.7–7.2)	7	12	1	Fairchild & Wilkerson (1986)

TABLE S4. *Data on randomly chosen specimens for morphometric body-flight analysis.*

QCAZ# refers to the Museum number assigned to voucher specimens. Flight hours refer to the collection time and are one-hour intervals. BS = body size (mm); TV = thorax volume (mm^3); WA = wing area (mm^2); WL = wing loading (mm^3/mm^2). n *= 150 (50* per *collecting site).*

QCAZ#	Altitude	Flight hours	BS	TV	WA	WL
44863	1180m	12-13	8.70	51.377	29.713	4.559
44864	1180m	16-17	9.90	71.606	32.280	5.463
44865	1180m	17-18	9.60	65.919	33.590	4.734
44866	1180m	09-10	11.80	97.114	38.044	6.409
44867	1180m	17-18	9.25	58.500	35.501	4.234
44868	1180m	17-18	8.80	56.489	32.494	3.923
44869	1180m	15-16	9.50	68.640	31.428	4.716
44870	1180m	15-16	8.30	60.913	31.010	3.882
44871	1180m	17-18	8.80	63.600	31.331	4.466
44872	1180m	12-13	9.00	55.998	31.690	4.610
44873	1180m	17-18	10.00	67.575	33.266	4.780
44874	1180m	14-15	9.22	56.929	35.220	3.922
44875	1180m	12-13	8.65	50.313	31.076	4.001
44876	1180m	17-18	9.60	74.233	32.077	5.353
44877	1180m	18-	9.15	55.662	32.823	4.194
44880	1180m	14-15	7.60	43.470	31.330	2.929
44883	1180m	15-16	10.75	82.448	37.452	5.772
44884	1180m	16-17	10.00	59.280	31.511	4.951
44886	1180m	13-14	9.40	77.561	34.742	4.880
44888	1180m	12-13	9.25	66.773	33.211	5.027
44923	1180m	11-12	9.90	80.929	34.978	5.266

44924	1180m	18-	9.60	62.938	33.568	4.737
44925	1180m	12-13	8.85	50.063	30.621	3.858
44926	1180m	13-14	8.60	50.635	31.710	4.187
44927	1180m	10-11	9.40	55.434	29.042	4.660
44928	1180m	16-17	8.80	40.359	28.034	3.620
44929	1180m	11-12	8.80	52.031	32.643	3.791
44930	1180m	13-14	8.62	55.813	29.585	4.279
44931	1180m	16-17	8.45	45.363	32.052	3.276
44932	1180m	18-	8.45	50.165	31.182	3.940
44933	1180m	14-15	8.40	55.646	31.674	3.736
44934	1180m	13-14	9.00	60.336	32.102	4.282
44935	1180m	16-17	9.05	73.041	32.274	4.551
44936	1180m	12-13	9.05	48.579	30.659	4.552
44937	1180m	14-15	9.12	61.423	31.211	4.378
44938	1180m	11-12	9.75	78.890	32.741	5.107
44939	1180m	17-18	9.50	88.378	33.140	5.507
44940	1180m	16-17	9.22	71.891	31.131	4.952
44941	1180m	18-	9.55	80.113	30.824	5.840
44942	1180m	17-18	9.85	76.659	31.807	5.586
44943	1180m	12-13	9.25	69.918	33.010	4.779
44944	1180m	11-12	9.80	63.272	36.902	3.863
44945	1180m	17-18	10.90	93.589	36.135	6.007
44946	1180m	15-16	10.40	82.225	32.398	5.738
44947	1180m	15-16	9.70	77.642	29.164	6.006
44948	1180m	10-11	10.25	95.030	31.964	6.283
44949	1180m	16-17	9.30	61.719	31.882	4.558
44950	1180m	13-14	10.20	80.419	32.794	6.027
44951	1180m	09-10	11.52	106.626	33.864	7.328

44952	1180m	09-10	10.70	85.260	34.955	6.214
44953	1680m	13-14	9.05	62.565	30.176	4.364
44954	1680m	09-10	9.60	60.454	27.374	5.048
44955	1680m	11-12	10.00	55.396	30.994	4.205
44956	1680m	09-10	9.00	56.278	29.457	3.953
44957	1680m	17-18	9.60	64.680	30.106	4.687
44958	1680m	09-10	10.35	57.008	30.919	4.490
44959	1680m	09-10	10.17	64.076	29.773	5.031
44960	1680m	13-14	9.65	58.127	29.362	4.682
44961	1680m	09-10	10.38	73.313	33.693	4.910
44962	1680m	10-11	9.55	62.172	28.941	4.827
44963	1680m	10-11	9.50	63.126	30.614	4.609
44964	1680m	16-17	8.90	51.334	29.755	3.937
44965	1680m	16-17	9.45	66.408	32.014	4.667
44966	1680m	09-10	9.35	51.188	30.156	3.968
44967	1680m	17-18	8.95	54.966	29.169	4.190
44968	1680m	10-11	11.50	95.301	31.483	7.283
44969	1680m	09-10	11.40	110.128	34.620	7.401
44970	1680m	10-11	11.85	93.363	34.627	6.588
44971	1680m	08-09	11.70	115.875	33.215	8.164
44972	1680m	16-17	11.88	121.875	38.790	7.178
44973	1680m	17-18	11.25	85.628	36.317	5.644
44974	1680m	13-14	12.00	100.684	33.548	7.132
44975	1680m	11-12	11.69	95.831	35.349	6.338
44976	1680m	09-10	11.80	100.695	33.969	6.996
44977	1680m	09-10	11.35	177.727	33.654	11.639
44978	1680m	11-12	11.80	122.381	35.288	7.649
44979	1680m	08-09	12.10	104.958	35.043	7.106

44980	1680m	17-18	10.80	81.885	31.763	5.801
44981	1680m	07-08	12.45	113.568	36.530	7.415
44982	1680m	06-07	10.90	90.028	32.681	6.191
44983	1680m	09-10	10.88	90.663	30.285	7.081
44879	1680m	09-10	12.10	115.706	34.439	7.971
44881	1680m	09-10	11.10	106.938	34.164	6.949
44882	1680m	08-09	11.60	103.313	33.868	7.077
44885	1680m	12-13	9.50	54.050	30.570	4.199
44887	1680m	15-16	11.50	113.625	33.887	7.636
44889	1680m	17-18	9.20	68.125	29.228	5.167
44890	1680m	12-13	9.75	74.014	31.956	5.252
44891	1680m	15-16	9.65	59.535	34.310	4.135
44892	1680m	12-13	9.55	66.270	29.938	4.404
44893	1680m	11-12	11.03	85.388	29.816	6.867
44894	1680m	17-18	10.50	87.010	32.442	6.230
44895	1680m	10-11	11.55	97.350	32.160	7.284
44896	1680m	13-14	11.25	82.984	35.382	5.614
44897	1680m	09-10	11.05	96.455	35.481	6.324
44898	1680m	17-18	10.05	72.229	31.642	5.155
44899	1680m	07-08	10.40	58.564	28.556	5.078
44900	1680m	10-11	11.05	63.210	34.918	4.652
44901	1680m	08-09	9.65	51.815	28.960	4.263
44902	1680m	16-17	10.25	63.000	30.418	5.055
44984	2180m	10-11	9.65	59.696	27.943	5.004
44985	2180m	11-12	9.50	58.794	31.260	4.358
44986	2180m	09-10	9.90	56.855	29.695	4.799
44987	2180m	12-13	10.20	62.898	34.238	4.461
44988	2180m	10-11	9.60	68.600	34.010	4.322

44989	2180m	10-11	10.45	82.203	29.766	6.140
44990	2180m	13-14	11.60	65.185	33.060	5.319
44991	2180m	09-10	9.80	75.319	35.682	4.597
44992	2180m	09-10	9.78	69.694	32.717	4.630
44993	2180m	13-14	10.10	65.078	32.088	4.820
44994	2180m	11-12	10.30	70.104	35.153	4.668
44995	2180m	09-10	10.00	65.492	32.903	4.796
44996	2180m	09-10	10.35	67.463	32.206	5.224
44997	2180m	10-11	10.80	75.305	34.146	5.293
44998	2180m	09-10	10.02	62.178	33.025	4.387
44999	2180m	12-13	11.50	93.225	33.405	6.686
45000	2180m	10-11	12.05	103.911	35.091	7.282
45001	2180m	09-10	11.15	96.615	33.774	6.645
45002	2180m	11-12	11.95	114.000	34.867	7.814
45003	2180m	09-10	12.30	118.125	34.511	8.019
45004	2180m	08-09	11.58	119.141	36.618	7.535
45005	2180m	17-18	12.00	115.875	31.823	8.484
45006	2180m	14-15	12.00	126.703	33.100	8.667
45007	2180m	10-11	12.50	134.640	38.866	7.873
45008	2180m	10-11	12.95	134.269	36.767	8.598
45009	2180m	10-11	11.75	103.895	33.264	7.490
45010	2180m	08-09	11.30	97.012	31.250	7.087
45011	2180m	13-14	12.30	117.731	35.327	7.808
45012	2180m	10-11	12.35	122.513	35.416	7.911
45013	2180m	09-10	12.12	114.278	36.271	7.343
44903	2180m	14-15	10.15	63.547	31.103	4.997
44904	2180m	13-14	10.58	91.438	31.481	6.469
44905	2180m	10-11	11.85	104.577	34.676	6.939

44906	2180m	10-11	9.85	55.915	27.914	4.872
44907	2180m	09-10	11.50	111.547	32.983	7.779
44908	2180m	14-15	11.75	121.378	34.838	7.652
44909	2180m	13-14	11.35	86.112	33.858	6.014
44910	2180m	10-11	11.30	110.625	36.397	6.869
44911	2180m	11-12	11.45	90.089	36.398	5.904
44912	2180m	11-12	11.65	107.494	33.618	7.602
44913	2180m	10-11	11.05	95.238	29.034	7.795
44914	2180m	10-11	12.10	119.109	36.313	7.560
44915	2180m	10-11	9.80	59.220	30.466	4.535
44916	2180m	11-12	10.95	75.636	33.502	5.683
44917	2180m	09-10	12.60	120.694	39.433	7.713
44918	2180m	14-15	12.30	122.063	36.514	7.832
44919	2180m	10-11	11.55	101.382	34.886	6.781
44920	2180m	09-10	10.30	73.966	27.728	6.039
44921	2180m	09-10	10.70	90.416	32.829	6.270
44922	2180m	10-11	11.52	100.213	37.417	6.362

TABLE S5. *Total abundance data (*n*) and weather variables* per *day, hour and site of collection (Altitude). Tmin = minimum temperature (ºC); Tmax = maximum temperature (ºC); RHmin = minimum relative humidity (%); RHmax = maximum relative humidity (%); PinHg = atmospheric pressure (Hg); Rainf. = rainfall (mm); Mist (0 = absence / 1 = presence).*

Altitude	**Day**	**Hour**	**n**	**Tmin**	**Tmax**	**RHmin**	**RHmax**	**PinHg**	**Rainf.**	**Mist**
1180m	1	06-07	0	15.00	15.20	77.10	77.50	26.12	0.00	0
1180m	1	07-08	0	15.10	15.30	91.10	91.90	26.11	0.00	0
1180m	1	08-09	0	18.10	18.63	76.10	71.76	25.99	0.00	0
1180m	1	09-10	0	20.80	21.20	61.10	67.70	25.99	0.00	0
1180m	1	10-11	0	21.60	21.70	67.41	71.60	26.03	0.00	0
1180m	1	11-12	0	22.10	22.20	72.20	75.40	26.06	0.00	0
1180m	1	12-13	0	22.70	23.78	67.37	77.10	26.00	0.00	0
1180m	1	13-14	0	23.20	23.90	63.00	78.80	25.93	0.00	0
1180m	1	14-15	0	22.50	23.20	67.50	83.80	26.00	0.00	0
1180m	1	15-16	0	21.70	22.30	82.40	88.70	26.01	0.00	0
1180m	1	16-17	0	21.00	21.30	85.70	89.20	26.04	0.00	0
1180m	1	17-18	0	20.10	20.30	88.90	89.70	26.06	0.00	0
1180m	2	06-07	0	15.20	15.70	86.50	90.21	26.06	0.00	0
1180m	2	07-08	0	15.30	15.90	87.30	90.30	26.10	0.00	0
1180m	2	08-09	0	17.10	18.10	88.20	91.20	26.09	0.00	0
1180m	2	09-10	0	18.90	20.30	89.02	92.01	26.08	0.00	0
1180m	2	10-11	0	21.57	22.74	74.51	81.35	26.00	0.00	0
1180m	2	11-12	0	22.30	22.90	64.00	73.30	26.05	0.00	0
1180m	2	12-13	0	21.80	22.80	54.84	72.20	26.04	0.00	0
1180m	2	13-14	0	21.90	22.60	51.90	71.00	26.02	0.00	0
1180m	2	14-15	0	22.10	23.45	55.46	73.82	25.96	0.00	0

1180m	2	15-16	0	22.20	24.30	63.80	75.90	25.90	0.00	0
1180m	2	16-17	0	21.80	23.00	69.30	75.80	25.90	0.00	0
1180m	2	17-18	0	21.30	21.60	72.70	75.70	25.91	0.00	0
1180m	3	06-07	0	17.10	17.20	86.50	86.80	23.85	0.00	0
1180m	3	07-08	0	17.20	17.50	91.50	92.10	26.08	0.00	0
1180m	3	08-09	0	18.12	18.09	91.07	90.70	26.22	0.00	0
1180m	3	09-10	0	18.70	18.90	87.80	89.30	25.96	0.00	0
1180m	3	10-11	0	19.08	19.49	84.81	86.01	25.96	0.00	0
1180m	3	11-12	0	19.30	19.70	83.70	85.50	25.95	0.00	0
1180m	3	12-13	0	19.22	19.63	84.78	85.53	25.98	0.00	0
1180m	3	13-14	0	19.30	19.40	87.50	88.40	26.01	0.00	0
1180m	3	14-15	0	19.10	19.36	90.67	89.56	26.01	0.00	0
1180m	3	15-16	0	18.90	19.40	92.80	93.90	26.02	0.00	0
1180m	3	16-17	0	18.85	19.90	91.60	93.70	26.02	0.00	0
1180m	3	17-18	0	19.40	19.90	88.60	93.40	26.01	0.00	0
1180m	4	06-07	0	16.20	16.20	87.70	88.00	25.88	0.00	0
1180m	4	07-08	0	16.30	16.40	95.70	96.40	26.03	0.00	0
1180m	4	08-09	0	19.28	19.00	89.00	90.70	26.06	0.00	0
1180m	4	09-10	0	19.90	21.50	82.30	84.90	26.00	0.00	0
1180m	4	10-11	0	19.93	21.10	81.70	85.30	25.92	0.00	0
1180m	4	11-12	0	20.10	20.60	81.00	85.70	25.88	0.00	0
1180m	4	12-13	0	20.42	21.83	77.32	85.00	25.90	0.00	0
1180m	4	13-14	0	20.60	22.70	76.90	84.20	25.96	0.00	0
1180m	4	14-15	0	20.20	21.99	84.42	88.79	25.96	0.00	0
1180m	4	15-16	0	19.30	19.30	98.00	98.20	25.96	0.00	0
1180m	4	16-17	0	19.20	19.30	98.10	98.30	25.98	0.00	0
1180m	4	17-18	0	19.10	19.20	98.10	98.40	26.00	0.00	0
1180m	5	06-07	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

1180m	5	07-08	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	5	08-09	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	5	09-10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	5	10-11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	5	11-12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	5	12-13	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	5	13-14	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	5	14-15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	5	15-16	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	5	16-17	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	5	17-18	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	6	06-07	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	6	07-08	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	6	08-09	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	6	09-10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	6	10-11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	6	11-12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	6	12-13	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	6	13-14	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	6	14-15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	6	15-16	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	6	16-17	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	6	17-18	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1180m	7	06-07	0	17.20	17.20	79.70	81.00	25.96	0.00	0
1180m	7	07-08	0	17.60	17.70	82.00	84.60	25.96	0.00	0
1180m	7	08-09	0	19.30	19.60	81.20	83.30	25.94	0.00	0
1180m	7	09-10	0	20.70	20.90	80.30	82.50	25.93	0.00	0
1180m	7	10-11	0	21.30	21.90	80.20	84.40	25.92	0.00	0

1180m	7	11-12	0	21.70	22.30	80.10	85.80	25.91	0.00	0
1180m	7	12-13	0	21.90	22.50	82.30	86.20	25.91	0.00	0
1180m	7	13-14	0	21.90	21.90	84.20	85.90	25.90	0.00	0
1180m	7	14-15	0	21.70	21.90	83.80	85.20	25.90	0.00	0
1180m	7	15-16	0	21.40	21.80	83.30	84.90	25.90	0.00	0
1180m	7	16-17	0	21.30	21.40	84.80	85.10	26.00	0.00	0
1180m	7	17-18	0	21.10	21.10	86.20	86.50	25.95	0.00	0
1180m	8	06-07	0	18.40	18.87	85.70	89.70	25.98	0.00	0
1180m	8	07-08	0	19.80	20.20	86.80	94.80	25.98	0.00	0
1180m	8	08-09	0	19.76	20.40	88.10	93.70	25.97	0.00	0
1180m	8	09-10	0	19.90	20.50	89.40	92.70	25.97	0.00	0
1180m	8	10-11	0	20.22	20.60	89.90	92.40	25.96	0.00	0
1180m	8	11-12	0	20.60	20.70	90.30	90.70	25.96	0.00	0
1180m	8	12-13	0	20.86	21.51	81.70	88.50	25.95	0.00	0
1180m	8	13-14	0	20.90	22.40	75.50	87.80	25.94	0.00	0
1180m	8	14-15	0	20.55	21.38	79.10	90.15	25.93	0.00	0
1180m	8	15-16	0	20.10	20.30	91.70	95.10	25.91	0.00	0
1180m	8	16-17	0	20.10	20.50	91.80	95.40	25.92	0.00	0
1180m	8	17-18	0	20.00	20.60	91.80	95.60	25.92	0.00	0
1180m	9	06-07	0	18.20	19.50	85.60	92.70	25.95	0.00	0
1180m	9	07-08	0	19.60	22.10	82.50	96.80	25.95	0.00	0
1180m	9	08-09	0	20.19	20.50	92.74	98.14	25.95	0.00	0
1180m	9	09-10	0	20.50	20.70	97.50	98.10	25.95	0.00	0
1180m	9	10-11	0	20.40	20.60	96.79	96.70	25.95	0.00	0
1180m	9	11-12	0	20.30	20.40	90.60	93.90	25.95	0.00	0
1180m	9	12-13	0	19.80	20.10	97.40	98.90	25.93	0.00	0
1180m	9	13-14	0	20.70	20.70	96.70	96.80	25.90	2.00	0
1180m	9	14-15	0	20.25	21.30	93.50	96.60	25.89	3.00	0

1180m	9	15-16	0	21.10	21.30	92.80	96.60	25.89	4.00	0
1180m	9	16-17	1	18.80	20.50	94.20	99.00	25.90	4.00	0
1180m	9	17-18	0	19.20	19.60	99.00	99.90	25.91	5.00	0
1180m	10	06-07	0	17.20	17.20	79.90	81.10	25.95	0.00	0
1180m	10	07-08	0	17.50	17.60	82.20	84.70	25.96	0.00	0
1180m	10	08-09	0	19.90	20.51	86.10	86.50	25.97	0.00	0
1180m	10	09-10	0	21.40	21.50	86.60	88.30	25.98	0.00	0
1180m	10	10-11	0	21.50	21.80	86.50	88.00	25.95	0.00	0
1180m	10	11-12	0	21.60	21.70	86.40	87.70	25.96	0.00	0
1180m	10	12-13	0	21.10	21.60	86.90	90.80	25.95	0.00	0
1180m	10	13-14	0	20.60	21.50	87.70	93.20	25.94	0.00	0
1180m	10	14-15	0	20.60	21.20	87.90	92.30	25.93	0.00	0
1180m	10	15-16	0	20.80	20.80	87.40	88.00	25.93	0.00	0
1180m	10	16-17	0	20.10	20.80	86.40	89.30	25.94	0.00	0
1180m	10	17-18	0	20.80	21.80	86.40	90.60	25.94	0.00	0
1180m	11	06-07	0	17.70	17.90	96.60	97.70	25.93	0.00	0
1180m	11	07-08	0	17.70	18.20	95.40	97.70	25.98	0.00	0
1180m	11	08-09	0	18.89	19.20	94.65	94.81	25.99	0.00	0
1180m	11	09-10	0	19.60	20.20	91.70	94.50	25.98	0.00	0
1180m	11	10-11	1	20.13	20.85	91.80	95.30	25.97	0.00	0
1180m	11	11-12	0	20.60	21.20	91.80	96.20	25.96	0.00	0
1180m	11	12-13	0	20.90	21.26	94.12	96.70	25.94	0.00	0
1180m	11	13-14	1	21.20	21.30	95.40	96.70	25.90	0.00	0
1180m	11	14-15	0	21.10	21.20	94.15	96.33	25.90	0.00	0
1180m	11	15-16	2	20.90	21.30	90.80	96.10	25.89	0.00	0
1180m	11	16-17	0	20.70	21.00	93.90	96.80	25.91	0.00	0
1180m	11	17-18	0	20.40	20.70	96.90	98.60	25.92	0.00	0
1180m	12	06-07	0	17.90	18.10	94.90	95.20	25.91	0.00	0

1180m	12	07-08	0	17.90	18.20	98.10	98.70	25.94	0.00	0
1180m	12	08-09	1	18.20	18.40	96.20	97.60	25.93	0.00	0
1180m	12	09-10	0	20.10	21.00	94.20	96.50	25.93	0.00	0
1180m	12	10-11	0	20.40	21.50	83.10	91.40	25.92	0.00	0
1180m	12	11-12	0	20.70	22.00	81.20	90.40	25.92	0.00	0
1180m	12	12-13	0	19.80	20.80	86.50	92.24	25.91	0.00	0
1180m	12	13-14	0	19.30	19.70	93.20	95.40	25.90	0.00	0
1180m	12	14-15	0	19.60	19.80	97.60	96.80	25.89	0.00	0
1180m	12	15-16	0	19.90	20.00	97.80	98.00	25.88	0.00	0
1180m	12	16-17	1	19.60	19.80	97.60	97.10	25.89	0.00	0
1180m	12	17-18	1	19.30	19.60	97.90	99.50	25.89	0.00	0
1180m	13	06-07	0	16.40	16.70	91.20	91.50	25.95	0.00	0
1180m	13	07-08	0	16.60	17.10	98.30	98.90	25.95	0.00	0
1180m	13	08-09	0	19.95	21.61	86.70	94.60	25.95	0.00	0
1180m	13	09-10	0	20.40	21.80	80.20	90.30	25.94	0.00	0
1180m	13	10-11	0	20.00	20.70	90.72	95.75	25.95	0.00	0
1180m	13	11-12	1	19.80	20.00	98.10	99.00	25.94	0.00	0
1180m	13	12-13	1	20.10	20.10	97.40	98.90	35.93	0.00	0
1180m	13	13-14	0	20.70	20.70	96.70	96.80	25.90	0.00	0
1180m	13	14-15	0	20.25	21.30	93.50	96.60	25.89	0.00	0
1180m	13	15-16	0	21.10	21.30	92.80	95.50	25.89	0.00	0
1180m	13	16-17	2	18.80	20.50	94.20	98.20	25.90	0.00	0
1180m	13	17-18	2	19.20	19.60	99.00	99.90	25.91	0.00	0
1180m	14	06-07	0	15.30	15.60	95.50	97.10	25.91	0.00	0
1180m	14	07-08	0	15.30	15.90	95.90	99.10	25.96	0.00	0
1180m	14	08-09	0	16.89	17.70	93.60	97.20	25.96	0.00	0
1180m	14	09-10	0	18.70	19.40	87.20	95.30	25.97	0.00	0
1180m	14	10-11	3	20.60	21.40	77.20	85.80	25.95	0.00	0

1180m	14	11-12	2	22.40	23.50	66.60	76.40	25.93	0.00	0
1180m	14	12-13	1	23.50	24.90	59.20	70.70	25.91	0.00	0
1180m	14	13-14	1	23.80	25.30	58.40	69.50	25.89	0.00	0
1180m	14	14-15	4	22.92	24.10	65.70	74.70	25.89	0.00	0
1180m	14	15-16	3	21.40	21.80	79.20	83.90	25.89	0.00	0
1180m	14	16-17	5	19.60	21.00	85.05	93.10	25.91	0.00	0
1180m	14	17-18	5	19.70	20.10	90.90	94.20	25.92	0.00	0
1180m	15	06-07	0	15.10	15.40	90.90	97.80	25.96	0.00	0
1180m	15	07-08	0	15.30	16.00	97.40	99.00	25.96	0.00	0
1180m	15	08-09	0	16.30	18.10	94.60	97.10	25.96	0.00	0
1180m	15	09-10	0	19.40	20.60	87.00	91.40	25.94	0.00	0
1180m	15	10-11	0	22.10	22.70	78.00	82.50	25.93	0.00	0
1180m	15	11-12	1	23.60	24.20	72.90	75.80	25.92	0.00	0
1180m	15	12-13	4	23.70	24.90	70.80	76.01	25.90	0.00	0
1180m	15	13-14	2	23.70	25.00	70.10	77.90	25.88	0.00	0
1180m	15	14-15	4	23.10	24.50	70.70	78.30	25.88	0.00	0
1180m	15	15-16	2	22.40	23.40	73.00	79.80	25.88	0.00	0
1180m	15	16-17	2	21.40	22.23	80.11	83.20	25.89	0.00	0
1180m	15	17-18	3	20.40	20.70	89.30	92.80	25.90	0.00	0
1180m	16	06-07	0	15.90	16.40	90.10	91.40	25.85	0.00	0
1180m	16	07-08	0	15.50	16.50	96.40	99.00	25.96	0.00	0
1180m	16	08-09	0	19.14	19.90	84.80	88.40	25.96	0.00	0
1180m	16	09-10	1	21.10	21.80	78.40	81.20	25.96	0.00	0
1180m	16	10-11	0	22.10	22.80	74.80	79.00	25.95	0.00	0
1180m	16	11-12	2	22.40	23.20	73.10	78.50	25.94	0.00	0
1180m	16	12-13	2	22.30	23.10	73.20	79.30	25.93	0.00	0
1180m	16	13-14	0	21.90	22.80	75.20	81.30	25.91	0.00	0
1180m	16	14-15	0	21.30	22.00	78.90	84.70	25.90	0.00	0

1180m	16	15-16	2	20.80	21.60	84.00	88.30	25.89	0.00	0
1180m	16	16-17	11	20.60	21.10	88.90	93.10	25.91	0.00	0
1180m	16	17-18	4	20.30	20.60	93.40	95.10	25.92	0.00	0
1180m	17	06-07	0	16.10	16.70	89.30	91.00	26.01	0.00	0
1180m	17	07-08	0	15.80	17.00	93.30	96.70	26.01	0.00	0
1180m	17	08-09	1	17.20	18.80	89.50	93.90	26.01	0.00	0
1180m	17	09-10	2	20.30	20.40	85.60	89.60	25.99	0.00	0
1180m	17	10-11	4	22.20	22.70	65.00	76.60	25.97	0.00	0
1180m	17	11-12	3	23.90	24.40	53.90	70.00	25.96	0.00	0
1180m	17	12-13	5	23.90	25.70	52.60	70.70	25.94	0.00	0
1180m	17	13-14	7	23.50	25.80	56.90	71.40	25.91	0.00	0
1180m	17	14-15	2	22.40	24.90	62.80	74.00	25.90	0.00	0
1180m	17	15-16	9	22.20	23.10	68.90	76.60	25.89	0.00	0
1180m	17	16-17	4	21.00	21.90	75.00	85.00	25.91	0.00	0
1180m	17	17-18	7	20.50	20.90	84.20	87.50	25.92	0.00	0
1180m	18	06-07	0	15.90	16.20	91.50	92.10	25.98	0.00	0
1180m	18	07-08	0	15.90	16.40	97.10	98.20	25.98	0.00	0
1180m	18	08-09	0	19.40	21.90	82.00	92.50	25.97	0.00	0
1180m	18	09-10	2	21.60	23.80	72.20	83.50	25.96	0.00	0
1180m	18	10-11	2	22.90	24.30	67.20	75.90	25.95	0.00	0
1180m	18	11-12	3	23.70	24.40	65.90	71.70	25.95	0.00	0
1180m	18	12-13	4	23.80	24.50	66.70	72.20	25.94	0.00	0
1180m	18	13-14	3	23.80	24.50	68.40	72.60	25.92	0.00	0
1180m	18	14-15	6	23.20	24.00	70.80	75.40	25.90	0.00	0
1180m	18	15-16	8	22.40	23.10	73.10	78.90	25.89	0.00	0
1180m	18	16-17	5	21.30	21.70	78.50	83.90	25.91	0.00	0
1180m	18	17-18	5	20.80	21.20	90.50	94.20	25.93	0.00	0
1180m	19	06-07	0	17.10	17.30	90.80	91.70	25.98	0.25	0

1180m	19	07-08	0	17.20	17.60	97.10	98.90	25.99	0.00	0
1180m	19	08-09	0	19.40	20.80	91.80	95.20	25.98	0.00	0
1180m	19	09-10	0	20.40	20.80	86.40	91.50	25.98	0.00	0
1180m	19	10-11	0	20.20	20.60	87.30	91.60	25.97	0.00	0
1180m	19	11-12	0	19.70	20.40	88.20	91.70	25.97	0.00	0
1180m	19	12-13	0	19.80	21.30	84.10	88.70	25.95	0.00	0
1180m	19	13-14	5	19.80	22.60	80.20	85.90	25.93	0.00	0
1180m	19	14-15	4	20.60	22.80	82.20	86.00	25.92	0.00	0
1180m	19	15-16	8	21.40	22.90	84.20	89.60	25.91	0.00	0
1180m	19	16-17	4	21.20	21.40	88.30	94.90	25.93	0.00	0
1180m	19	17-18	8	19.40	20.00	92.90	95.00	25.94	0.00	0
1180m	20	06-07	0	15.80	16.30	89.10	91.30	25.99	0.00	0
1180m	20	07-08	0	16.00	16.90	93.90	98.30	26.00	0.00	0
1180m	20	08-09	0	17.20	18.90	87.80	93.90	26.01	0.00	0
1180m	20	09-10	4	19.70	20.40	80.60	85.60	26.01	0.00	0
1180m	20	10-11	4	21.50	21.90	79.40	83.50	25.99	0.00	0
1180m	20	11-12	2	21.80	22.20	78.10	81.30	25.98	0.00	0
1180m	20	12-13	0	21.00	21.60	82.80	86.10	25.96	0.00	0
1180m	20	13-14	0	19.90	20.60	88.60	91.80	25.96	0.00	0
1180m	20	14-15	1	19.10	19.90	93.05	93.60	25.95	0.00	0
1180m	20	15-16	0	19.60	19.70	94.50	95.40	25.95	0.00	0
1180m	20	16-17	2	19.50	19.80	95.00	96.60	25.96	0.00	0
1180m	20	17-18	3	19.30	19.80	95.50	97.70	25.97	0.00	0
1680m	1	06-07	0	14.20	14.70	98.10	99.60	29.96	0.00	0
1680m	1	07-08	1	14.80	15.70	97.60	99.90	29.95	0.00	0
1680m	1	08-09	6	16.30	16.60	97.10	99.60	29.97	0.00	0
1680m	1	09-10	6	16.40	16.70	97.50	98.90	29.97	0.00	0
1680m	1	10-11	5	16.70	16.90	94.40	97.70	29.96	0.00	0

1680m	1	11-12	19	17.40	18.70	89.50	93.90	29.96	0.00	0
1680m	1	12-13	4	17.80	18.30	81.10	91.60	29.93	0.00	0
1680m	1	13-14	8	16.30	16.60	87.70	93.50	29.93	0.00	0
1680m	1	14-15	7	16.20	16.70	85.90	90.00	29.91	0.00	0
1680m	1	15-16	18	16.80	17.20	86.00	89.50	29.89	0.00	0
1680m	1	16-17	5	16.60	17.10	89.70	92.60	29.89	0.00	0
1680m	1	17-18	9	16.20	16.70	93.40	96.20	29.90	0.00	0
1680m	2	06-07	0	15.30	15.80	88.50	92.60	29.93	0.00	0
1680m	2	07-08	0	16.10	16.90	84.00	89.70	29.96	0.00	0
1680m	2	08-09	3	17.10	17.70	80.90	85.40	29.96	0.00	0
1680m	2	09-10	21	17.10	17.70	85.40	89.70	29.97	0.00	0
1680m	2	10-11	16	17.50	18.30	83.60	88.60	29.96	0.00	0
1680m	2	11-12	7	17.10	17.60	88.90	92.90	29.94	0.00	0
1680m	2	12-13	14	17.60	18.10	85.50	89.20	29.92	0.00	0
1680m	2	13-14	8	16.80	17.30	92.80	94.70	29.91	0.00	0
1680m	2	14-15	23	17.30	17.40	91.90	94.30	29.89	0.00	0
1680m	2	15-16	16	17.20	17.40	89.70	92.50	29.88	0.00	0
1680m	2	16-17	6	16.40	16.80	93.40	96.50	29.88	0.00	0
1680m	2	17-18	15	15.70	15.80	99.20	99.60	29.89	0.00	0
1680m	3	06-07	12	15.10	15.50	80.40	85.10	29.93	0.00	0
1680m	3	07-08	0	17.00	17.50	72.80	78.50	29.94	0.00	0
1680m	3	08-09	11	17.80	18.30	72.60	76.70	29.95	0.00	0
1680m	3	09-10	32	19.40	20.00	67.70	73.00	29.94	0.00	0
1680m	3	10-11	25	21.10	21.40	63.40	67.70	29.94	0.00	0
1680m	3	11-12	12	21.40	22.00	62.70	69.10	29.93	0.00	0
1680m	3	12-13	6	21.40	23.30	64.30	71.20	29.91	0.00	0
1680m	3	13-14	31	18.60	19.10	80.50	86.20	29.88	0.00	0
1680m	3	14-15	27	17.70	18.30	91.10	94.00	29.88	1.00	0

1680m	3	15-16	13	17.10	17.40	99.90	99.90	29.87	1.00	1
1680m	3	16-17	8	16.70	17.40	99.90	99.90	29.86	15.00	1
1680m	3	17-18	12	16.50	17.10	99.90	99.90	29.85	35.00	1
1680m	4	06-07	0	14.60	14.80	99.90	99.90	29.94	0.00	1
1680m	4	07-08	1	15.10	15.60	99.90	99.90	29.95	0.00	1
1680m	4	08-09	3	15.50	16.20	99.90	99.90	29.98	0.00	0
1680m	4	09-10	6	16.60	17.10	99.90	99.90	29.96	0.00	1
1680m	4	10-11	1	17.00	17.40	99.90	99.90	29.95	0.00	1
1680m	4	11-12	2	17.30	17.70	99.90	99.90	29.94	0.00	1
1680m	4	12-13	5	17.30	18.10	99.90	99.90	29.92	0.00	1
1680m	4	13-14	2	17.00	17.50	99.90	99.90	29.90	0.00	1
1680m	4	14-15	0	17.10	17.30	99.90	99.90	29.88	0.00	1
1680m	4	15-16	0	16.40	16.70	99.90	99.90	29.89	0.00	1
1680m	4	16-17	0	16.30	16.50	99.90	99.90	29.89	0.00	1
1680m	4	17-18	12	15.40	16.40	99.90	99.90	29.90	0.00	0
1680m	5	06-07	2	15.60	15.90	86.80	97.70	29.93	0.00	0
1680m	5	07-08	2	16.10	16.70	85.70	94.80	29.96	0.00	0
1680m	5	08-09	1	16.10	16.30	99.90	99.90	29.97	0.00	0
1680m	5	09-10	6	16.60	17.30	95.20	99.90	29.97	0.00	0
1680m	5	10-11	15	17.70	18.10	89.80	99.90	29.98	0.00	0
1680m	5	11-12	17	18.00	18.40	94.80	99.90	29.96	0.00	0
1680m	5	12-13	6	17.80	18.30	99.90	99.90	29.93	0.00	0
1680m	5	13-14	10	17.60	17.90	99.90	99.90	29.92	0.00	0
1680m	5	14-15	8	17.60	18.10	99.90	99.90	29.90	0.00	1
1680m	5	15-16	22	17.80	18.30	99.90	99.90	29.89	0.00	1
1680m	5	16-17	35	17.00	17.80	99.90	99.90	29.89	0.00	1
1680m	5	17-18	8	16.50	16.80	99.90	99.90	29.90	0.00	1
1680m	6	06-07	0	15.20	15.80	96.60	99.90	29.95	0.00	0

1680m	6	07-08	13	16.00	16.70	95.80	99.80	29.96	0.00	0
1680m	6	08-09	22	16.70	17.60	91.90	99.60	29.97	0.00	0
1680m	6	09-10	51	18.00	19.10	90.70	98.40	29.97	0.00	0
1680m	6	10-11	24	17.90	18.40	96.60	99.90	29.98	0.00	0
1680m	6	11-12	33	17.90	18.60	96.30	99.90	29.96	0.00	0
1680m	6	12-13	11	17.90	18.80	96.00	99.90	29.94	0.00	0
1680m	6	13-14	18	18.00	18.40	99.70	99.90	29.91	0.00	0
1680m	6	14-15	8	17.50	18.10	99.90	99.90	29.90	0.00	1
1680m	6	15-16	7	16.90	17.30	99.90	99.90	29.90	0.00	1
1680m	6	16-17	1	16.20	16.30	99.90	99.90	29.89	0.00	1
1680m	6	17-18	13	16.30	16.60	99.90	99.90	29.91	0.00	1
1680m	7	06-07	0	15.60	16.20	93.30	97.60	29.96	0.00	0
1680m	7	07-08	13	16.30	18.30	82.20	94.80	29.97	0.00	0
1680m	7	08-09	13	17.30	18.10	87.30	95.90	29.97	0.00	0
1680m	7	09-10	34	18.20	18.80	88.30	94.50	29.99	0.00	0
1680m	7	10-11	62	18.70	19.20	87.10	97.70	29.98	0.00	0
1680m	7	11-12	14	18.50	19.10	93.40	98.90	29.97	0.00	0
1680m	7	12-13	8	17.30	18.20	99.90	99.90	29.95	0.00	0
1680m	7	13-14	7	16.40	17.10	99.90	99.90	29.93	0.00	1
1680m	7	14-15	8	15.90	16.20	99.90	99.90	29.87	1.00	1
1680m	7	15-16	6	15.60	16.10	99.90	99.90	29.89	2.00	1
1680m	7	16-17	4	15.60	16.10	99.90	99.90	29.86	2.00	1
1680m	7	17-18	10	15.70	15.70	99.90	99.90	29.92	3.00	1
1680m	8	06-07	4	15.00	16.00	96.20	99.20	29.91	0.00	0
1680m	8	07-08	15	16.30	17.90	87.10	99.90	29.93	0.00	0
1680m	8	08-09	29	17.40	18.20	88.40	98.50	29.94	0.00	0
1680m	8	09-10	57	18.80	19.20	87.40	97.10	29.94	0.00	0
1680m	8	10-11	58	19.10	20.20	86.00	95.60	29.95	0.00	0

1680m	8	11-12	41	18.90	19.80	90.00	98.40	29.94	0.00	0
1680m	8	12-13	26	18.10	19.20	85.70	98.70	29.92	0.00	0
1680m	8	13-14	28	18.00	18.50	92.80	96.90	29.91	0.00	0
1680m	8	14-15	19	17.30	17.80	96.90	99.90	29.89	0.00	0
1680m	8	15-16	11	16.90	17.50	99.90	99.90	29.87	0.00	0
1680m	8	16-17	20	16.90	17.20	99.90	99.90	29.88	0.00	0
1680m	8	17-18	18	16.60	17.20	99.90	99.90	29.89	0.00	0
1680m	9	06-07	3	15.90	16.70	83.90	89.90	29.89	0.00	0
1680m	9	07-08	10	16.80	18.80	80.50	90.50	29.90	0.00	0
1680m	9	08-09	30	18.10	19.80	78.00	89.00	29.91	0.00	0
1680m	9	09-10	35	19.20	20.70	81.00	91.40	29.91	0.00	0
1680m	9	10-11	66	19.70	21.70	77.60	86.20	29.91	0.00	0
1680m	9	11-12	56	19.90	21.70	80.00	91.40	29.91	0.00	0
1680m	9	12-13	21	17.70	19.80	86.40	95.50	29.89	0.00	0
1680m	9	13-14	13	17.20	18.10	86.60	95.50	29.87	0.00	0
1680m	9	14-15	14	16.70	18.20	84.60	96.80	29.85	0.00	0
1680m	9	15-16	18	16.40	16.80	93.50	97.90	29.85	0.00	0
1680m	9	16-17	12	16.20	16.70	94.60	99.60	29.85	0.00	0
1680m	9	17-18	18	15.80	16.30	96.00	98.70	29.85	0.00	0
1680m	10	06-07	1	15.70	16.10	90.10	94.50	29.91	0.00	0
1680m	10	07-08	10	16.80	18.20	83.00	94.10	29.93	0.00	0
1680m	10	08-09	21	17.50	18.20	84.90	90.80	29.94	0.00	0
1680m	10	09-10	35	18.20	19.00	83.10	88.60	29.95	0.00	0
1680m	10	10-11	53	19.40	20.70	80.00	87.70	29.93	0.00	0
1680m	10	11-12	58	20.20	21.40	80.50	88.50	29.91	0.00	0
1680m	10	12-13	18	18.60	20.40	88.80	95.70	29.89	0.00	0
1680m	10	13-14	11	16.90	17.70	99.90	99.90	29.88	0.00	1
1680m	10	14-15	20	17.10	17.60	99.90	99.90	29.85	0.00	1

1680m	10	15-16	8	16.30	16.90	99.90	99.90	29.86	0.00	1
1680m	10	16-17	9	16.20	16.40	99.90	99.90	29.87	0.00	1
1680m	10	17-18	5	16.20	16.70	99.90	99.90	29.87	0.00	1
1680m	11	06-07	0	15.60	16.20	99.90	99.90	29.95	0.00	0
1680m	11	07-08	11	15.80	17.60	99.90	99.90	29.98	0.00	0
1680m	11	08-09	17	17.60	18.80	99.90	99.90	29.98	0.00	0
1680m	11	09-10	25	18.70	20.20	92.70	99.90	29.98	0.00	0
1680m	11	10-11	30	20.40	21.70	86.40	94.30	29.96	0.00	0
1680m	11	11-12	31	20.60	22.60	87.00	94.70	29.95	0.00	0
1680m	11	12-13	11	18.10	19.10	94.90	99.90	29.94	0.00	1
1680m	11	13-14	8	17.40	18.60	99.90	99.90	29.91	1.00	1
1680m	11	14-15	8	17.30	18.00	99.90	99.90	29.89	0.00	1
1680m	11	15-16	4	16.90	17.50	99.90	99.90	29.88	0.00	1
1680m	11	16-17	3	16.80	17.10	99.90	99.90	29.87	0.00	1
1680m	11	17-18	6	16.60	16.90	99.90	99.90	29.88	0.00	0
1680m	12	06-07	2	15.20	15.90	95.10	99.90	29.94	0.00	0
1680m	12	07-08	1	15.70	16.20	98.00	99.90	29.96	0.00	0
1680m	12	08-09	0	16.10	17.80	97.50	99.90	29.97	0.00	0
1680m	12	09-10	25	17.20	18.60	94.70	99.90	29.96	0.00	0
1680m	12	10-11	11	17.70	18.40	99.90	99.90	29.95	0.00	0
1680m	12	11-12	3	17.40	18.00	99.90	99.90	29.91	0.00	0
1680m	12	12-13	4	17.30	18.10	99.90	99.90	29.89	0.00	0
1680m	12	13-14	0	16.70	17.40	99.90	99.90	29.87	0.00	1
1680m	12	14-15	0	16.40	17.20	99.90	99.90	29.85	0.00	1
1680m	12	15-16	0	16.40	16.90	99.90	99.90	29.83	0.00	1
1680m	12	16-17	0	16.10	16.40	99.90	99.90	29.83	0.00	1
1680m	12	17-18	4	16.10	16.30	99.90	99.90	29.86	1.00	1
1680m	13	06-07	0	14.80	15.40	99.90	99.90	29.89	0.00	0

1680m	13	07-08	2	15.40	16.70	99.90	99.90	29.93	0.00	0
1680m	13	08-09	19	16.60	17.30	97.20	99.90	29.93	0.00	0
1680m	13	09-10	24	17.10	18.30	99.30	99.90	29.93	0.00	0
1680m	13	10-11	7	17.20	18.00	99.90	99.90	29.92	0.00	0
1680m	13	11-12	5	16.90	17.70	99.90	99.90	29.90	0.00	1
1680m	13	12-13	2	16.90	17.20	99.90	99.90	29.89	0.00	1
1680m	13	13-14	5	16.60	17.00	99.90	99.90	29.87	0.00	1
1680m	13	14-15	1	16.50	17.00	99.90	99.90	29.86	0.00	1
1680m	13	15-16	3	16.20	16.80	99.90	99.90	29.86	0.00	1
1680m	13	16-17	1	16.30	16.70	99.90	99.90	29.86	2.00	1
1680m	13	17-18	4	16.20	16.40	99.90	99.90	29.87	1.00	1
1680m	14	06-07	0	14.40	16.10	85.50	96.10	29.88	0.00	0
1680m	14	07-08	17	16.30	18.90	82.50	90.50	29.90	0.00	0
1680m	14	08-09	35	17.40	19.10	78.70	90.70	29.92	0.00	0
1680m	14	09-10	47	18.90	20.80	76.20	86.60	29.91	0.00	0
1680m	14	10-11	57	20.80	22.50	73.40	85.50	29.90	0.00	0
1680m	14	11-12	49	20.00	21.70	83.30	94.70	29.90	0.00	0
1680m	14	12-13	18	18.20	20.00	94.50	99.90	29.90	0.00	0
1680m	14	13-14	11	17.40	18.10	99.90	99.90	29.87	0.00	1
1680m	14	14-15	15	17.00	17.80	99.90	99.90	29.85	10.00	1
1680m	14	15-16	0	16.80	17.50	99.90	99.90	29.82	15.00	1
1680m	14	16-17	0	16.70	17.10	99.90	99.90	29.81	5.00	1
1680m	14	17-18	0	16.50	16.90	99.90	99.90	29.81	5.00	1
1680m	15	06-07	0	15.10	16.70	99.90	99.90	29.87	0.00	0
1680m	15	07-08	4	16.10	17.10	99.90	99.90	29.88	0.00	0
1680m	15	08-09	25	17.00	18.20	99.90	99.90	29.88	0.00	0
1680m	15	09-10	30	18.20	19.40	95.50	99.90	29.88	0.00	0
1680m	15	10-11	60	19.80	20.30	95.20	99.90	29.88	0.00	0
1680m	15	11-12	30	19.20	21.40	99.90	99.90	29.87	0.00	0
1680m	15	12-13	20	18.60	19.10	92.60	99.90	29.85	0.00	0
1680m	15	13-14	5	16.60	18.60	99.90	99.90	29.83	0.00	1
1680m	15	14-15	12	16.70	17.60	99.90	99.90	29.83	0.00	1
1680m	15	15-16	12	17.10	17.40	99.90	99.90	29.83	0.00	1
1680m	15	16-17	25	17.10	17.70	99.90	99.90	29.84	0.00	0

1680m	15	17-18	22	16.80	17.60	99.90	99.90	29.84	0.00	0
1680m	16	06-07	0	14.90	15.80	99.90	99.90	29.87	0.00	0
1680m	16	07-08	5	15.70	16.80	97.50	99.90	29.88	0.00	0
1680m	16	08-09	9	16.30	17.70	95.20	97.50	29.89	0.00	0
1680m	16	09-10	35	17.80	19.40	91.90	99.10	29.88	0.00	0
1680m	16	10-11	22	18.40	19.40	92.70	99.90	29.88	0.00	0
1680m	16	11-12	33	18.10	19.00	99.90	99.90	29.87	0.00	0
1680m	16	12-13	12	17.90	18.50	99.90	99.90	29.84	0.00	0
1680m	16	13-14	7	17.50	18.10	99.90	99.90	29.82	0.00	0
1680m	16	14-15	35	17.60	18.30	99.90	99.90	29.83	0.00	0
1680m	16	15-16	38	17.70	18.30	99.90	99.90	29.81	0.00	0
1680m	16	16-17	17	17.40	18.20	99.90	99.90	29.81	0.00	0
1680m	16	17-18	10	17.30	17.80	99.90	99.90	29.83	0.00	0
1680m	17	06-07	0	15.30	15.90	99.90	99.90	29.87	0.00	0
1680m	17	07-08	2	15.70	16.80	99.90	99.90	29.89	0.00	0
1680m	17	08-09	1	15.70	16.30	99.90	99.90	29.92	0.00	1
1680m	17	09-10	0	15.80	16.30	99.90	99.90	29.93	0.00	1
1680m	17	10-11	4	16.10	17.20	99.90	99.90	29.92	0.00	1
1680m	17	11-12	7	16.80	17.20	99.90	99.90	29.90	0.00	0
1680m	17	12-13	1	16.50	16.90	99.90	99.90	29.90	0.00	0
1680m	17	13-14	4	16.50	17.40	99.90	99.90	29.86	0.00	0
1680m	17	14-15	22	17.50	18.60	99.90	99.90	29.85	0.00	0
1680m	17	15-16	25	17.80	18.40	99.90	99.90	29.84	0.00	0
1680m	17	16-17	17	17.60	18.00	99.90	99.90	29.85	0.00	0
1680m	17	17-18	17	17.00	17.40	99.90	99.90	29.86	0.00	0
1680m	18	06-07	0	15.70	16.10	99.90	99.90	29.89	0.00	0
1680m	18	07-08	3	16.00	17.20	99.90	99.90	29.89	0.00	0
1680m	18	08-09	2	16.00	17.00	99.90	99.90	29.90	0.00	0

1680m	18	09-10	2	16.10	16.70	99.90	99.90	29.90	0.00	1
1680m	18	10-11	1	16.20	16.80	99.90	99.90	29.89	0.00	1
1680m	18	11-12	1	16.60	17.20	99.90	99.90	29.88	0.00	1
1680m	18	12-13	1	16.60	17.30	99.90	99.90	29.88	0.00	1
1680m	18	13-14	0	16.40	17.20	99.90	99.90	29.87	0.00	1
1680m	18	14-15	1	16.30	17.00	99.90	99.90	29.85	0.00	1
1680m	18	15-16	10	16.70	17.20	99.90	99.90	29.84	0.00	1
1680m	18	16-17	11	16.90	17.20	99.90	99.90	29.85	0.00	1
1680m	18	17-18	7	16.80	17.10	99.90	99.90	29.86	0.00	1
1680m	19	06-07	0	15.20	15.80	99.90	99.90	29.92	0.00	0
1680m	19	07-08	9	15.60	17.30	99.90	99.90	29.91	0.00	0
1680m	19	08-09	35	17.10	18.80	99.90	99.90	29.91	0.00	0
1680m	19	09-10	51	18.60	20.10	93.20	99.90	29.92	0.00	0
1680m	19	10-11	45	19.40	20.70	96.40	99.90	29.91	0.00	0
1680m	19	11-12	43	19.80	21.40	95.50	99.90	29.87	0.00	0
1680m	19	12-13	29	19.10	20.30	99.90	99.90	29.87	0.00	0
1680m	19	13-14	14	17.80	19.40	99.90	99.90	29.85	0.00	0
1680m	19	14-15	14	17.90	18.30	99.90	99.90	29.84	0.00	0
1680m	19	15-16	24	18.20	18.80	99.90	99.90	29.83	0.00	0
1680m	19	16-17	40	18.20	18.80	99.90	99.90	29.85	0.00	0
1680m	19	17-18	33	17.60	18.30	99.90	99.90	29.85	0.00	0
1680m	20	06-07	0	15.00	15.40	99.90	99.90	29.89	0.00	0
1680m	20	07-08	3	15.20	16.70	99.90	99.90	29.92	0.00	0
1680m	20	08-09	1	15.80	17.20	99.90	99.90	29.93	0.00	1
1680m	20	09-10	2	15.80	16.80	99.90	99.90	29.95	0.00	1
1680m	20	10-11	0	15.90	16.40	99.90	99.90	29.94	4.00	0
1680m	20	11-12	1	16.10	16.80	99.90	99.90	29.92	1.00	0
1680m	20	12-13	2	16.40	17.10	99.90	99.90	29.89	0.00	0

1680m	20	13-14	0	16.40	17.10	99.90	99.90	29.86	0.00	0
1680m	20	14-15	12	16.40	17.30	99.90	99.90	29.84	0.00	0
1680m	20	15-16	20	17.10	17.60	99.90	99.90	29.85	0.00	0
1680m	20	16-17	17	16.80	17.60	99.90	99.90	29.85	0.00	0
1680m	20	17-18	7	16.70	17.10	99.90	99.90	29.86	0.00	0
2180m	1	06-07	0	11.20	13.10	95.60	99.90	28.19	0.00	0
2180m	1	07-08	0	12.70	14.60	93.30	99.90	28.20	0.00	0
2180m	1	08-09	1	14.10	15.40	93.50	99.90	28.21	0.00	0
2180m	1	09-10	7	15.20	16.30	93.90	99.90	28.22	0.00	0
2180m	1	10-11	0	14.90	16.20	99.90	99.90	28.21	0.00	0
2180m	1	11-12	0	14.40	15.30	99.90	99.90	28.20	0.00	1
2180m	1	12-13	0	13.30	14.00	99.90	99.90	28.19	0.00	1
2180m	1	13-14	0	13.20	13.90	99.90	99.90	28.16	0.00	1
2180m	1	14-15	0	13.70	14.40	99.90	99.90	28.14	1.00	1
2180m	1	15-16	0	13.20	14.90	99.90	99.90	28.17	2.00	1
2180m	1	16-17	0	12.70	13.90	99.90	99.90	28.16	3.00	1
2180m	1	17-18	0	11.60	13.00	99.90	99.90	28.17	1.00	1
2180m	2	06-07	0	10.60	12.40	99.90	99.90	28.19	0.00	0
2180m	2	07-08	0	12.50	14.10	96.10	99.90	28.21	0.00	0
2180m	2	08-09	5	13.60	15.40	94.30	99.90	28.24	0.00	0
2180m	2	09-10	2	14.20	15.60	99.20	99.90	28.24	0.00	0
2180m	2	10-11	6	14.20	15.60	99.90	99.90	28.24	0.00	0
2180m	2	11-12	1	14.40	15.70	98.20	99.90	28.22	0.00	0
2180m	2	12-13	0	13.40	14.60	99.50	99.90	28.21	0.00	0
2180m	2	13-14	0	13.40	13.90	95.70	99.90	28.18	0.00	0
2180m	2	14-15	0	12.90	14.00	99.90	99.90	28.17	0.00	0
2180m	2	15-16	0	12.70	13.80	97.30	99.90	28.17	0.00	0
2180m	2	16-17	0	12.60	12.90	95.70	99.90	28.17	0.00	0

2180m	2	17-18	0	11.30	12.40	97.90	99.90	28.18	2.00	0
2180m	3	06-07	0	12.70	13.90	96.90	99.90	28.20	0.00	0
2180m	3	07-08	0	13.40	15.70	92.90	99.90	28.23	0.00	0
2180m	3	08-09	0	14.40	15.60	94.30	99.90	28.23	0.00	0
2180m	3	09-10	15	15.20	16.80	96.10	99.90	28.25	0.00	0
2180m	3	10-11	17	15.90	17.80	95.20	99.90	28.24	0.00	0
2180m	3	11-12	3	15.20	19.50	95.70	99.90	28.23	0.00	0
2180m	3	12-13	5	14.30	16.30	99.90	99.90	28.20	0.00	1
2180m	3	13-14	0	13.80	15.70	99.90	99.90	28.19	0.00	1
2180m	3	14-15	0	13.30	14.60	99.90	99.90	28.17	0.00	1
2180m	3	15-16	0	13.40	13.90	99.90	99.90	28.18	3.00	0
2180m	3	16-17	0	13.40	13.80	99.90	99.90	28.20	2.00	0
2180m	3	17-18	0	13.10	13.70	99.90	99.90	28.22	1.00	0
2180m	4	06-07	0	12.10	12.70	99.90	99.90	28.26	0.00	0
2180m	4	07-08	3	12.60	13.90	99.90	99.90	28.27	0.00	1
2180m	4	08-09	3	13.90	15.80	99.90	99.90	28.28	0.00	0
2180m	4	09-10	0	14.10	16.20	99.90	99.90	28.29	0.00	0
2180m	4	10-11	8	16.00	17.40	99.90	99.90	28.27	0.00	0
2180m	4	11-12	6	15.40	19.90	99.90	99.90	28.26	0.00	0
2180m	4	12-13	0	14.70	16.80	99.90	99.90	28.24	0.00	1
2180m	4	13-14	0	14.30	15.10	99.90	99.90	28.18	2.00	1
2180m	4	14-15	0	14.20	14.60	99.90	99.90	28.19	2.00	1
2180m	4	15-16	0	13.80	14.50	99.90	99.90	28.14	2.00	1
2180m	4	16-17	0	13.70	14.20	99.90	99.90	28.14	2.00	1
2180m	4	17-18	0	13.70	14.20	99.90	99.90	28.17	2.00	1
2180m	5	06-07	0	13.20	13.60	99.90	99.90	28.20	0.00	1
2180m	5	07-08	0	13.10	13.90	99.90	99.90	28.25	0.00	1
2180m	5	08-09	0	13.10	14.70	99.90	99.90	28.26	1.00	1

2180m	5	09-10	0	13.60	15.10	99.90	99.90	28.27	1.00	1
2180m	5	10-11	0	14.10	15.10	99.90	99.90	28.26	1.00	1
2180m	5	11-12	0	14.00	14.80	99.90	99.90	28.23	1.00	1
2180m	5	12-13	0	14.10	14.70	99.90	99.90	28.23	1.00	1
2180m	5	13-14	0	14.10	14.70	99.90	99.90	28.21	1.00	1
2180m	5	14-15	1	14.10	14.70	99.90	99.90	28.19	1.00	1
2180m	5	15-16	0	13.80	14.60	99.90	99.90	28.18	1.00	1
2180m	5	16-17	0	13.20	14.10	99.90	99.90	28.19	1.00	1
2180m	5	17-18	0	13.10	13.50	99.90	99.90	28.20	1.00	1
2180m	6	06-07	0	11.60	12.30	99.90	99.90	28.26	0.00	0
2180m	6	07-08	0	12.20	13.90	99.90	99.90	28.29	0.00	0
2180m	6	08-09	8	13.90	16.60	99.90	99.90	28.29	0.00	0
2180m	6	09-10	29	16.50	18.60	99.90	99.90	28.28	0.00	0
2180m	6	10-11	21	17.10	19.50	99.90	99.90	28.27	0.00	0
2180m	6	11-12	6	16.20	19.90	99.90	99.90	28.25	0.00	0
2180m	6	12-13	2	15.70	17.40	99.90	99.90	28.23	0.00	1
2180m	6	13-14	1	15.60	17.40	99.90	99.90	28.20	1.00	1
2180m	6	14-15	0	14.80	15.70	99.90	99.90	28.19	4.00	1
2180m	6	15-16	0	14.20	15.10	99.90	99.90	28.18	2.00	1
2180m	6	16-17	0	13.60	15.10	99.90	99.90	28.19	2.00	1
2180m	6	17-18	0	13.50	13.80	99.90	99.90	28.21	1.00	1
2180m	7	06-07	0	11.30	12.40	99.90	99.90	28.22	0.00	0
2180m	7	07-08	0	11.60	13.40	99.90	99.90	28.25	0.00	0
2180m	7	08-09	0	12.90	14.60	99.90	99.90	28.25	0.00	0
2180m	7	09-10	3	14.30	15.40	99.90	99.90	28.25	0.00	0
2180m	7	10-11	2	15.30	16.60	99.90	99.90	28.27	0.00	0
2180m	7	11-12	3	15.40	17.00	99.90	99.90	28.26	0.00	0
2180m	7	12-13	17	16.00	18.40	99.90	99.90	28.24	0.00	0

2180m	7	13-14	18	16.30	18.60	99.90	99.90	28.21	0.00	0
2180m	7	14-15	4	15.30	16.40	99.90	99.90	28.21	0.00	0
2180m	7	15-16	1	15.80	16.60	99.90	99.90	28.19	0.00	0
2180m	7	16-17	3	15.30	16.40	99.90	99.90	28.19	0.00	0
2180m	7	17-18	1	14.70	15.60	99.90	99.90	28.20	0.00	0
2180m	8	06-07	0	11.80	13.20	99.00	99.90	28.21	0.00	0
2180m	8	07-08	0	13.30	14.50	96.60	99.90	28.24	0.00	0
2180m	8	08-09	0	14.30	16.00	95.80	99.90	28.25	0.00	0
2180m	8	09-10	14	16.00	17.40	99.90	99.90	28.25	0.00	0
2180m	8	10-11	36	15.70	18.30	99.90	99.90	28.24	0.00	0
2180m	8	11-12	1	15.70	17.60	99.90	99.90	28.24	0.00	1
2180m	8	12-13	1	15.40	16.80	99.90	99.90	28.21	0.00	1
2180m	8	13-14	0	14.90	16.80	99.90	99.90	28.20	0.00	1
2180m	8	14-15	1	14.30	14.20	99.90	99.90	28.18	0.30	1
2180m	8	15-16	0	14.30	13.90	99.90	99.90	28.19	0.30	1
2180m	8	16-17	0	13.60	14.30	99.90	99.90	28.21	0.30	1
2180m	8	17-18	0	13.70	13.90	99.90	99.90	28.22	0.30	1
2180m	9	06-07	0	11.70	12.70	99.90	99.90	28.24	0.00	0
2180m	9	07-08	0	12.60	14.20	99.90	99.90	28.25	0.00	1
2180m	9	08-09	5	13.90	15.80	99.90	99.90	28.26	0.00	0
2180m	9	09-10	22	15.20	17.10	99.90	99.90	28.27	0.00	0
2180m	9	10-11	33	16.80	18.70	99.90	99.90	28.23	0.00	0
2180m	9	11-12	41	16.80	18.60	99.90	99.90	28.22	0.00	0
2180m	9	12-13	18	16.90	18.60	99.90	99.90	28.19	0.00	0
2180m	9	13-14	10	16.30	17.30	99.90	99.90	28.16	0.00	1
2180m	9	14-15	3	15.40	16.70	99.90	99.90	28.15	1.00	1
2180m	9	15-16	0	14.60	15.60	99.90	99.90	28.17	2.00	1
2180m	9	16-17	1	13.30	14.90	99.90	99.90	28.16	1.00	0

2180m	9	17-18	3	13.30	13.80	99.90	99.90	28.17	0.00	0
2180m	10	06-07	0	13.50	14.10	99.90	99.90	28.18	0.00	1
2180m	10	07-08	0	13.90	15.60	99.90	99.90	28.19	0.00	1
2180m	10	08-09	1	14.40	15.50	99.90	99.90	28.19	0.00	1
2180m	10	09-10	1	15.10	16.60	99.90	99.90	28.20	0.00	1
2180m	10	10-11	14	16.10	18.30	99.90	99.90	28.17	0.00	1
2180m	10	11-12	4	15.90	19.30	99.90	99.90	28.16	0.00	1
2180m	10	12-13	1	15.30	16.70	99.90	99.90	28.14	0.50	1
2180m	10	13-14	0	15.20	16.50	99.90	99.90	28.11	0.50	1
2180m	10	14-15	0	15.10	15.50	99.90	99.90	28.10	0.50	1
2180m	10	15-16	2	15.10	15.80	99.90	99.90	28.10	0.00	0
2180m	10	16-17	3	15.20	15.70	99.90	99.90	28.09	0.00	1
2180m	10	17-18	0	14.70	15.30	99.90	99.90	28.10	0.00	1
2180m	11	06-07	0	12.40	12.80	99.90	99.90	28.18	0.00	0
2180m	11	07-08	0	12.70	14.00	99.90	99.90	28.19	0.00	0
2180m	11	08-09	0	13.40	13.80	99.90	99.90	28.20	0.00	1
2180m	11	09-10	0	13.40	14.40	99.90	99.90	28.21	1.00	1
2180m	11	10-11	0	13.90	14.60	99.90	99.90	28.20	1.00	1
2180m	11	11-12	0	13.40	14.80	99.90	99.90	28.19	1.00	1
2180m	11	12-13	0	14.10	14.80	99.90	99.90	28.17	1.00	1
2180m	11	13-14	0	13.80	14.80	99.90	99.90	28.15	1.00	1
2180m	11	14-15	0	13.50	14.40	99.90	99.90	28.13	1.00	1
2180m	11	15-16	0	13.10	13.90	99.90	99.90	28.13	0.00	1
2180m	11	16-17	0	12.90	13.90	99.90	99.90	28.14	0.00	1
2180m	11	17-18	0	12.50	13.30	99.90	99.90	28.15	0.00	0
2180m	12	06-07	0	11.60	12.60	99.90	99.90	28.20	0.00	0
2180m	12	07-08	0	12.30	14.10	99.90	99.90	28.22	0.00	0
2180m	12	08-09	0	14.00	16.30	99.90	99.90	28.23	0.00	0

2180m	12	09-10	8	15.40	17.40	99.90	99.90	28.24	0.00	0
2180m	12	10-11	1	14.90	15.80	99.90	99.90	28.24	0.00	1
2180m	12	11-12	0	14.70	16.10	99.90	99.90	28.21	0.00	1
2180m	12	12-13	0	13.90	14.80	99.90	99.90	28.19	1.00	1
2180m	12	13-14	0	14.00	15.00	99.90	99.90	28.17	0.00	0
2180m	12	14-15	0	13.90	14.70	99.90	99.90	28.13	1.00	0
2180m	12	15-16	0	14.00	14.40	99.90	99.90	28.13	0.00	1
2180m	12	16-17	0	13.40	14.20	99.90	99.90	28.14	0.00	1
2180m	12	17-18	0	13.60	13.90	99.90	99.90	28.14	0.00	1
2180m	13	06-07	0	13.10	13.80	99.90	99.90	28.26	0.00	1
2180m	13	07-08	0	13.40	14.00	99.90	99.90	28.27	0.00	1
2180m	13	08-09	0	13.20	14.70	99.90	99.90	28.29	0.00	1
2180m	13	09-10	1	14.10	14.70	99.90	99.90	28.29	0.00	1
2180m	13	10-11	0	14.60	15.90	99.90	99.90	28.29	0.00	1
2180m	13	11-12	1	14.70	17.20	99.90	99.90	28.27	0.00	1
2180m	13	12-13	0	13.90	17.50	99.90	99.90	28.25	0.50	1
2180m	13	13-14	0	14.10	14.50	99.90	99.90	28.22	1.00	1
2180m	13	14-15	0	14.30	14.50	99.90	99.90	28.21	3.00	1
2180m	13	15-16	0	14.10	14.20	99.90	99.90	28.20	5.00	1
2180m	13	16-17	0	13.80	14.40	99.90	99.90	28.21	2.00	1
2180m	13	17-18	0	13.50	14.00	99.90	99.90	28.24	15.00	1
2180m	14	06-07	0	12.20	12.70	99.90	99.90	28.26	0.00	0
2180m	14	07-08	0	12.10	13.60	99.90	99.90	28.27	0.00	0
2180m	14	08-09	5	13.40	15.70	99.90	99.90	28.29	0.00	0
2180m	14	09-10	5	15.30	16.70	99.90	99.90	28.29	0.00	0
2180m	14	10-11	2	15.70	17.40	99.90	99.90	28.28	0.00	1
2180m	14	11-12	0	16.90	18.30	99.90	99.90	28.27	0.00	1
2180m	14	12-13	4	17.20	21.20	99.90	99.90	28.23	0.00	1

2180m	14	13-14	2	17.20	21.90	99.90	99.90	28.21	0.00	1
2180m	14	14-15	0	16.20	17.90	99.90	99.90	28.19	0.00	1
2180m	14	15-16	0	14.80	17.70	99.90	99.90	28.19	0.00	1
2180m	14	16-17	0	14.30	15.60	99.90	99.90	28.21	0.00	1
2180m	14	17-18	0	13.70	14.70	99.90	99.90	28.21	0.00	1
2180m	15	06-07	0	12.60	13.80	99.90	99.90	28.25	0.00	0
2180m	15	07-08	0	13.80	14.90	99.90	99.90	28.26	0.00	0
2180m	15	08-09	2	14.70	16.60	99.90	99.90	28.28	0.00	0
2180m	15	09-10	21	16.40	17.90	99.90	99.90	28.29	0.00	0
2180m	15	10-11	10	16.30	18.70	99.90	99.90	28.28	0.00	0
2180m	15	11-12	0	15.30	16.90	99.90	99.90	28.27	0.00	1
2180m	15	12-13	3	15.20	16.80	99.90	99.90	28.24	0.00	0
2180m	15	13-14	1	15.70	17.30	99.90	99.90	28.20	0.00	0
2180m	15	14-15	6	15.70	17.50	99.90	99.90	28.19	0.00	0
2180m	15	15-16	6	15.20	17.40	99.90	99.90	28.18	0.00	0
2180m	15	16-17	0	14.90	15.70	99.90	99.90	28.19	0.00	1
2180m	15	17-18	2	14.20	15.40	99.90	99.90	28.19	0.00	0
2180m	16	06-07	0	12.40	13.40	99.90	99.90	28.24	0.00	0
2180m	16	07-08	0	13.10	14.50	99.90	99.90	28.25	0.00	0
2180m	16	08-09	2	14.40	16.30	99.90	99.90	28.25	0.00	0
2180m	16	09-10	19	16.30	18.10	99.90	99.90	28.24	0.00	0
2180m	16	10-11	48	17.40	19.10	99.90	99.90	28.23	0.00	0
2180m	16	11-12	15	17.20	18.60	99.90	99.90	28.19	0.00	1
2180m	16	12-13	19	17.20	20.10	99.90	99.90	28.18	0.00	1
2180m	16	13-14	6	16.80	20.10	99.90	99.90	28.14	0.00	1
2180m	16	14-15	3	16.10	18.10	99.90	99.90	28.14	0.00	1
2180m	16	15-16	2	15.70	17.50	99.90	99.90	28.14	0.00	1
2180m	16	16-17	2	15.30	16.70	99.90	99.90	28.14	0.00	0

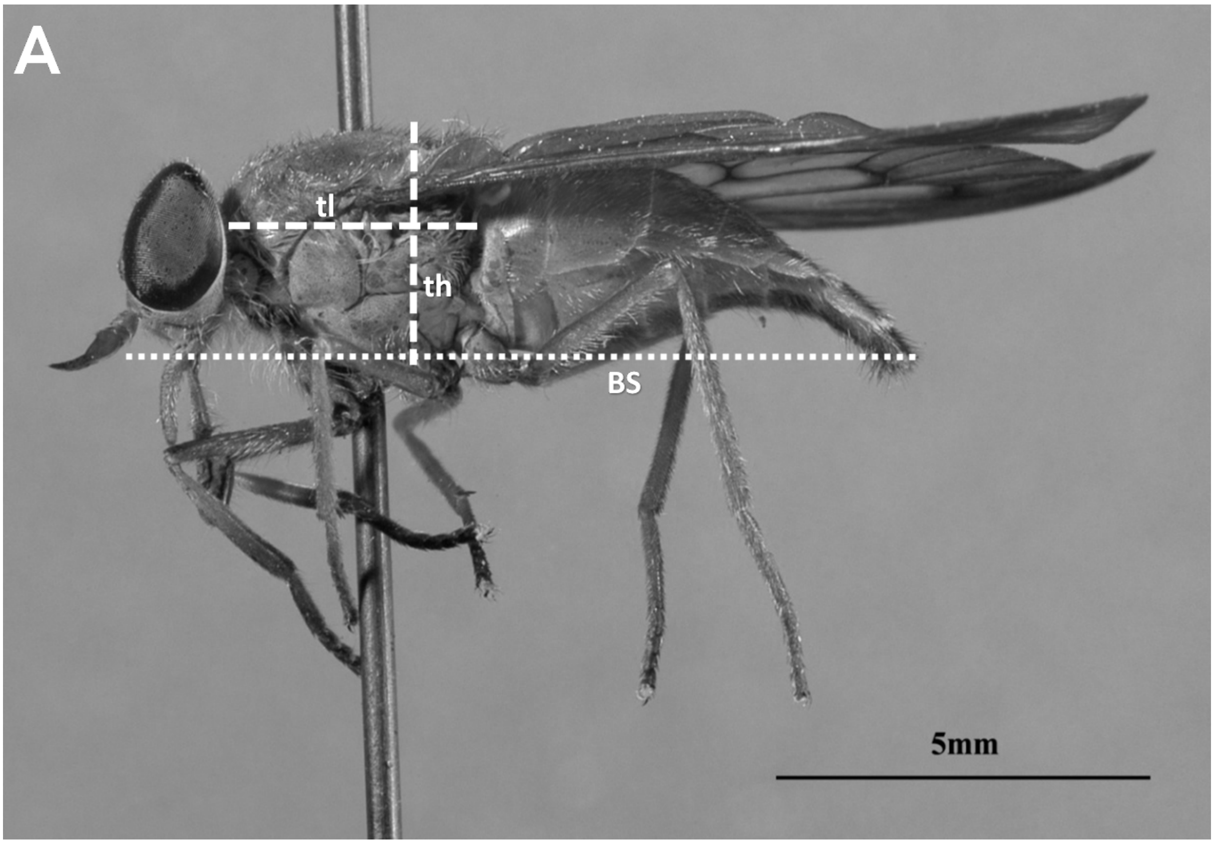
2180m	16	17-18	1	14.20	15.40	99.90	99.90	28.16	0.00	0
2180m	17	06-07	0	11.80	13.20	99.90	99.90	28.22	0.00	0
2180m	17	07-08	1	13.30	15.30	99.90	99.90	28.23	0.00	0
2180m	17	08-09	4	14.90	16.00	99.90	99.90	28.24	0.00	0
2180m	17	09-10	20	15.60	18.70	99.90	99.90	28.24	0.00	0
2180m	17	10-11	14	16.80	18.70	99.90	99.90	28.21	0.00	1
2180m	17	11-12	14	16.90	19.80	99.90	99.90	28.19	0.00	1
2180m	17	12-13	2	16.40	19.00	99.90	99.90	28.17	0.00	1
2180m	17	13-14	7	16.30	18.10	99.90	99.90	28.13	0.00	1
2180m	17	14-15	1	15.80	17.20	99.90	99.90	28.13	0.00	1
2180m	17	15-16	1	14.90	16.80	99.90	99.90	28.12	0.00	1
2180m	17	16-17	0	14.30	15.50	99.90	99.90	28.13	0.50	1
2180m	17	17-18	0	13.50	14.70	99.90	99.90	28.14	0.50	1
2180m	18	06-07	0	11.10	12.70	99.90	99.90	28.21	0.00	0
2180m	18	07-08	3	12.80	14.60	99.90	99.90	28.24	0.00	0
2180m	18	08-09	8	14.60	16.50	99.90	99.90	28.24	0.00	0
2180m	18	09-10	14	16.40	18.10	99.90	99.90	28.23	0.00	0
2180m	18	10-11	8	17.10	18.90	99.90	99.90	28.22	0.00	0
2180m	18	11-12	6	17.00	20.30	99.90	99.90	28.21	0.00	1
2180m	18	12-13	1	15.80	18.80	99.90	99.90	28.20	0.00	1
2180m	18	13-14	0	15.50	17.20	99.90	99.90	28.18	0.50	1
2180m	18	14-15	1	15.10	16.10	99.90	99.90	28.16	0.50	1
2180m	18	15-16	0	15.40	16.10	99.90	99.90	28.15	0.00	1
2180m	18	16-17	0	15.20	15.90	99.90	99.90	28.16	0.00	1
2180m	18	17-18	1	14.80	16.20	99.90	99.90	28.16	0.00	1
2180m	19	06-07	0	11.40	12.40	99.90	99.90	28.21	0.00	0
2180m	19	07-08	0	12.60	14.10	99.90	99.90	28.23	0.00	0
2180m	19	08-09	5	13.90	15.80	99.90	99.90	28.24	0.00	0

2180m	19	09-10	17	15.70	17.90	99.90	99.90	28.26	0.00	0
2180m	19	10-11	13	16.30	17.90	99.90	99.90	28.24	0.00	0
2180m	19	11-12	5	16.70	18.20	99.90	99.90	28.22	0.00	0
2180m	19	12-13	7	16.80	19.80	99.90	99.90	28.19	0.00	0
2180m	19	13-14	10	16.90	19.30	99.90	99.90	28.17	0.00	1
2180m	19	14-15	11	16.70	19.10	99.90	99.90	28.14	0.00	0
2180m	19	15-16	3	15.40	17.90	99.90	99.90	28.14	0.30	1
2180m	19	16-17	1	14.70	15.50	99.90	99.90	28.14	0.30	1
2180m	19	17-18	0	13.80	14.90	99.90	99.90	28.15	0.30	1
2180m	20	06-07	0	9.90	12.10	99.90	99.90	28.20	0.00	0
2180m	20	07-08	0	11.80	13.70	99.90	99.90	28.23	0.00	0
2180m	20	08-09	0	13.40	15.20	99.90	99.90	28.23	0.00	0
2180m	20	09-10	10	15.00	16.70	99.90	99.90	28.24	0.00	0
2180m	20	10-11	30	16.50	19.20	99.90	99.90	28.22	0.00	0
2180m	20	11-12	8	17.40	21.90	99.90	99.90	28.20	0.00	0
2180m	20	12-13	5	16.70	18.40	99.90	99.90	28.17	0.00	1
2180m	20	13-14	7	16.90	19.10	99.90	99.90	28.15	0.00	1
2180m	20	14-15	6	15.40	18.30	99.90	99.90	28.14	0.00	1
2180m	20	15-16	0	15.10	16.30	99.90	99.90	28.14	0.00	1
2180m	20	16-17	0	14.70	15.50	99.90	99.90	28.13	0.00	1
2180m	20	17-18	0	14.40	14.90	99.90	99.90	28.14	0.00	1

TABLE S6. *Simulated and observed niche overlap Czekanowski indexes using RA2 algorithm in EcoSim, version 7.72. Indexes of species columns correspond to pairwise tests of observed niche overlap with* Stypommisa *sp.*

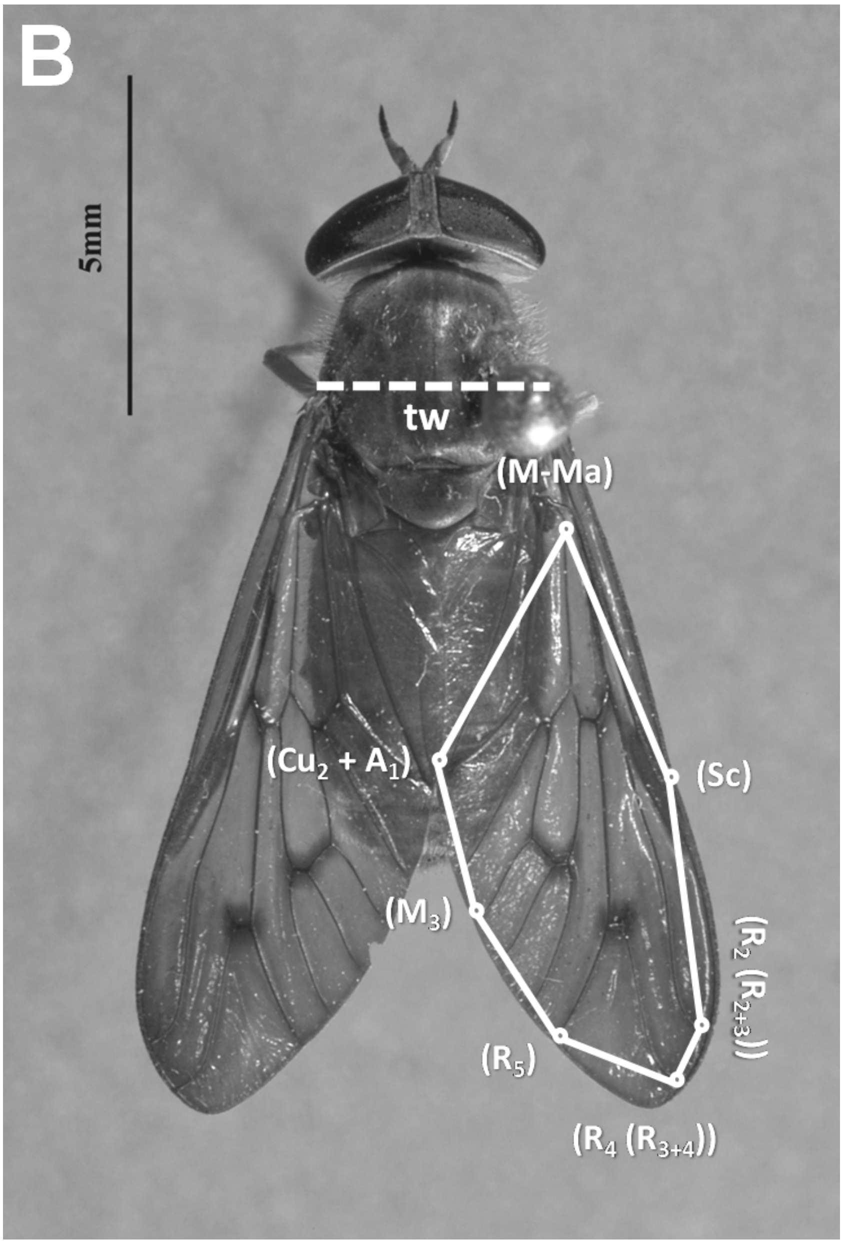
Collecting Sites	Means and variances of full model simulated indices	Means and variances of isolated *Stypommisa* spp. simulated indices	*Stypommisa lerida*	*Tabanus thiemeanus*	*Scione* aff. *flavescens*	*Tabanus* sp.1	*Dasychela ocellus*
E1 (1180 m)	0.5156 ± 0.00203	0.5075 ± 0.00896	0.5623	0.7572	0.5944	.	.
E2 (1680 m)	0.5325 ± 0.00132	0.5385 ± 0.00757	0.7869	0.7213	0.6975	0.5969	.
E3 (2180 m)	0.4278 ± 0.00312	0.4240 ± 0.00812	0.6535	.	.	.	0.5283

FIGURE S1. *Parameters used for the calculation of body morphometrics*



(A)

BS calculation corresponded to the measure of the lateral view body length (mm) from the head frontal callus to the VII abdominal segment. BV (in mm^3) was calculated as the product of thorax width (tw), thorax height (th) and body size (BS). TV (in mm^3) was calculated as the product of thorax width (tw) **(in B)**, length (tl) and height (th).



(B)

Vein-vein landmarks were set at the intersection of Media (M) and anterior branch of media (MA). Vein-edge intersection landmarks were set at subcosta (Sc), posterior branches of radius (R$_2$ (R$_{2+3}$)), (R$_4$ (R$_{3+4}$)), R$_5$, posterior branch of media (M3) and anterior branch of cubitus (Cu$_2$ + A$_1$).