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A study of biometric features of *Menacanthus cornutus* infesting domestic Indian fowl (*Gallus gallus domesticus*)

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Abstract

Nine morphometric characters of the poultry lice, *Menacanthus cornutus* were described by the statistics of location and dispersion. The departure from normality has been tested by skewness and kurtosis.

Keywords: poultry, ectoparasites, *Menacanthus cornutus*, statistics, dispersion.

INTRODUCTION

Over the years, biometric analyses of measurements of various somatic characteristics of insect bodies have been routinely carried out. Anybody working with a species' biology, even taxonomists, can benefit from knowing about its variations. A review of the literature shows that the workers documented the dimensions, typically in fragmented form, in the early taxonomic descriptions for the mallophagan species. Additionally, the data are often collated and at the most arithmetic mean estimated in the majority of biting lice taxonomies. Biting lice's quantitative characteristics have been used by a few number of workers to determine relationships between and within specific taxa on populations (Eichler, 1970; Eveleigh and Amano, 1977; Klockenhoff *et al*., 1979). Standard error of means, range standard deviation, and coefficient of variations for each measured character are generally accepted as additional components of a typical species description (Sokal, 1965). Reputable taxonomists Sokal and Rohlf (1969); Mayr (1969) have advised the biometrical study of morphological data.

In the past thirty years, few researchers have focused on biometric analysis of a small number of avian Phthiraptera. Tjonneland (1955) and Martin-Marteo (1984) applied statistical analysis to the body dimensions of a few chosen species. Lonc has tasted the diversity of two species of *Columbicola* (1985). From this perspective, Lonc (1990) researched four types of poultry lice. There has also been discussion of the effects of variations on lice morphology (Lonc and Maslej, 1986). Additionally, Lonc *et al.* (1992) investigated the morphometric variability of the phthirapteran population (five species) from Polish and Indian poultry birds. A biometric analysis of goat biting lice (genus Bovicola) utilizing nine common features was attempted preliminarily by Kumar *et al.* in 1995. Castersana *et al.* (1999) conducted a biometric analysis of phthirapterans infesting Anatidae. Singh (1999) conducted similar investigations on four types of pigeon lice. Studies on the morphometric variability of *Menopon gallinae*, the chicken body louse, have been conducted by Kumar & Saxena (1993) and Prelesov (2000). Beg *et al.* (2004) are now measuring five species that infest house crows using biometric analysis.

The current study aims to analyze the nine morphometric characteristics of *Menacanthus cornutus.*

Materials and methods

The chosen lice species for this investigation were obtained by fumigation from birds that were considered to be lousy hosts (*Gallus gallus domesticus*) (Gupta *et al*., 2007). During the current experiments, thirty adult male and thirty adult female poultry louse were employed each. The lice were treated for 12 hours in 10% KOH, cleaned (with xylene), and mounted (with DPX) after being treated with 5% acidic solution (after washing). Measurements were made using a ocular and stage micrometer. Nine somatic characters were measured for the purpose head length (HL), head width (HW), prothorax length (PL), prothorax width (PW), pterothorax length (PTL), pterothorax width (PTW), abdomen length (AL), abdomen width (AW) and total length (TL). Certain common measures of statistics of location and dispersion. Viz arithmetic mean (X), median (M), mode (m), standard deviation (SD), standard error (SE) have been expressed by value of skewness (g_1 and kurtosis (g_2).

Result and discussion

The abdominal length of males exhibited the same value for three measures of central tendency. Four characters of males (HL, HW, PL, PTL) and female (HL, HW, PL, PTL) had the same value for two central tendency measures. The value of remaining characters of both the sexes (had dissimilar value of central tendency. Lower value of SD (0.02) were recorded for PL in males and HL and PTL for females. Abdominal length males and females should higher values of SD (0.05). The values of SD for the remaining characters of both the sexes remained 0.03 to 0.04.

Value of CV for two characters of males (AL, TL) and three characters of females (AL, AW, TL) remained less than 5% Three characters of males (HL, PL, PTL) and two characters of females (HL PL) had higher value of CV (more than 10%). Other characters of males and females exhibited value of CV for 5 to 10%.

The value of skewness (g_1) of three characters of males (HW, PTW, TL) and two characters of females (HW, AW) were skewed towards the left side (negative values). The values of all the other characters of both sexes were skewed towards the right side (positive values). As far as Kurtosis is concerned the value of all the characters of both the sexes exhibited platykurtic condition (value of g_2 less than 30). None of the characters showed platykurtic or leptokurtic condition.

Information about the variability of morphological characters of species is valuable for the taxonomists (to do give clues regarding the nature and extent of variation). Hence species description should include the mean, SD, SE, and range and CV.

Normally avian host do not harbor more than five species out domestic fowl (*Gallus gallus domesticus*) is particular host which carries 13 species of lice as a consequence of domestication that caused greater

density breeding together with wide distribution in the world (Lonc *et al.*, 1997). The normal distribution of the character is supposed to have the same value of different measures of central tendency (i.e. Y= M=m). In the present case, such a condition was four characters on two instances. However constant character of the three species exculpated similar values of three increases of central tendency

The standard deviation values provide important clues regarding the extent of variation of species i.e. higher values of SD indicate greater variation and lower variation indicate lesser variation. In case of one amblyceran poultry lice (*Menacanthus cornutus*) by and large the dimension (length and width) of head, prothorax and pterothorax exhibit lesser values. Greater values of SD were found for depth and width of abdomen and total length dimension of abdomen should give less weightage for taxonomic purpose.

Coefficient of variance (CV) is used tool for recording variation when comparable samples of same species are collected from different localities. Characters having higher value of CV more than 10% may as quite variable. However, values of CV of different characters of *Menacanthus cornutus* exhibited diffused picture.

Departure from normality is often estimated by skewness (g_1). In normal distribution the values of $g_1$is supposed to be 0 (negative value indicating skewness towards left and positive values shows skewness to right side). In case of three poultry lice taken into consideration (*M. cornutus*) 11-13 character of species were formed positively skewed (remaining negatively skewed).

Kurtosis is yet another measure that indicates the form of distribution. Greater values of g_2 above occur when curve is more peaked and lesser values less than 3 indicate that curve is more flat and however in case of 1 poultry lice taken into consideration all the character exhibited plotibiotic condition.

Statistical analysis of the vital morphological characters of one amblyceran poultry lice (*Menacanthus cornutus*) indicated that dimensions of head, prothorax, and pterothorax exhibit less variation (than abdominal dimensions and total length) based on SD- 11 to 13 characters of one poultry lice appeared to be positively skewed (remaining negatively skewed) by and large most characters of one species of poultry lice exhibit probiotic condition.

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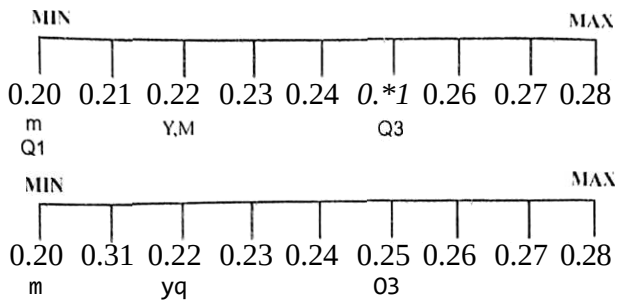


.ii› - 0.02
t'\' = 12.I
g1 = 0.55
g2 = -0.84
SD = 0.02
CV = 12.1
SE =0.005
g1 = 0.55

HEAD LENGTH (HL)

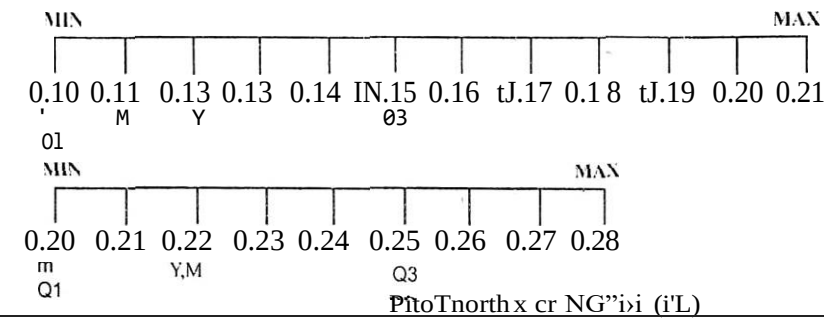
0.40 0.41 0.42 0.43 0.44 0.45 0.46 0.47 0.48 0.49 0.'S0 0.11 0.s2
Al Y M m

ti -./.,a
g* - -i.Js

0.40 0.4J 0.42 0.43 0.44 0.45 0.46 0.47 0.48 0.4') 0.50 0.51 0.52
O I Y M O3

SE = 0.008
g1 = -0.53
g2 = -1.49

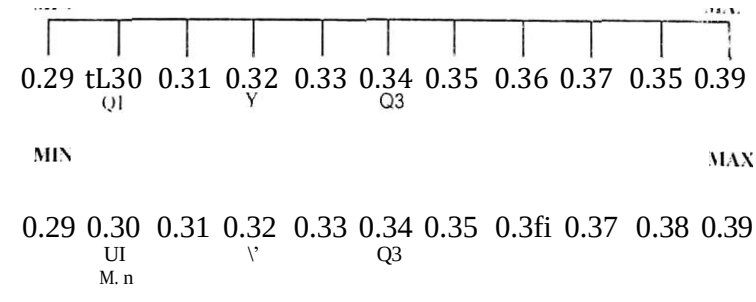
HEAD W1DTH (£1W)



SD = 0.03
C'\' = 2Y.0
5£:=0006
g1 = 1.02
g2 = -0.42

SD = 0.02
CV = 12.1
SE =0.005
g1 = 0.55
g2 = -0.84

P1toTnorth x cr NG"i›i (i'L)



CV = 9.4
SE = 0.005
g1 = 1.06
g2 = -0.2

SD = 0.03
C V = 9.4
SE = 0.005
g1 = 1.06
g2 = -0.2

PROTflOItEX WIDTIJ (I'W)

0.20 0.21 0.22 0.23 0.24 tL25 0.26 0.27 0.2b
* KM O3
Q1

SE =0.005
g1 = 0.55
g2 = -0.84

0.29 0.30 0.31 0.32 0.33 0.34 0.35 0,36 0.37 0.38 0..i9
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, M PTER0THOREMLENGTH(klt0

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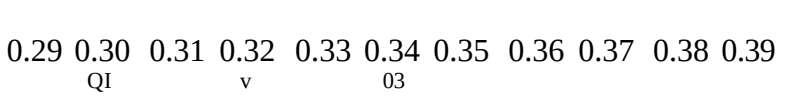
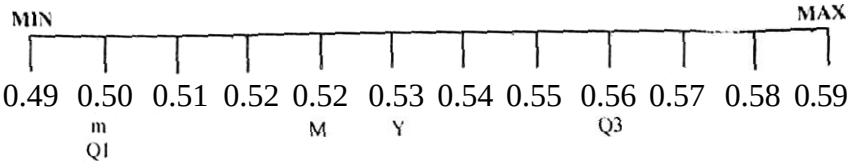
WIDTH. AND PTEROTHOREX LENGTH. OF MALE AND FEMALE *MENACANTHUS cornutus*

sun via

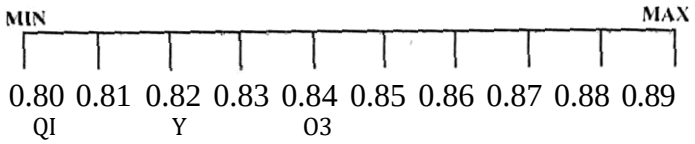


SE = 0.0(
g1 = 1.06
g2 = -0.2



5D=001
CV = 5.14
S}.=0.005
gl•OJ2
gZ=-1.35

PTEROTHOREX WFDTH (PW)

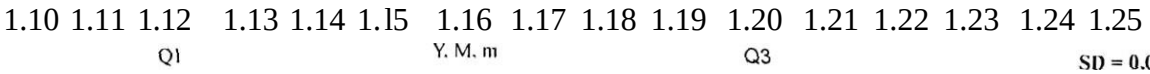


SD = 0.03

SE = 0.005
g1 = 0.94
g2 = -0.51

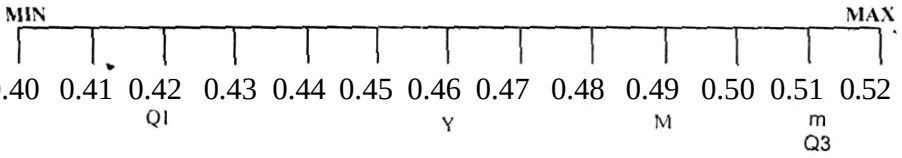
*HN

MAX

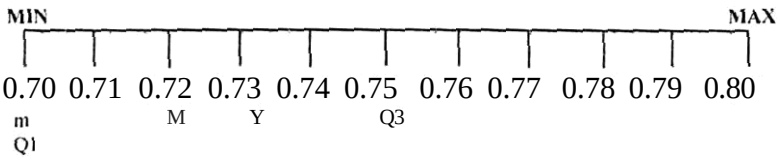


SD = 0.04
CV=t27
SE=0.008
gl *0.16
g2 = -0.97

ABDOMEN LENGTH (ABL)



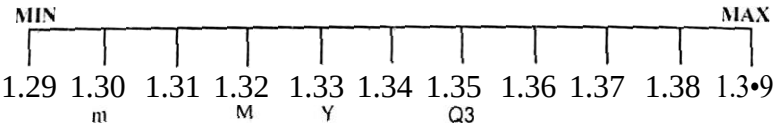
SD = 0.04
CV = 9.79
SE = 0.008
g1 = -0.53
B2=-1.49



SD • 0.03

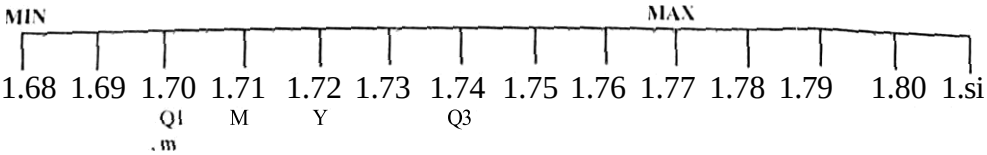
SE • 0.006
gi • -a.81
*• -a.sz

ABDOMEN WIDTH (ABW)



SD=0@3

SE = 0.005
g1 = -0.64
g2 = -1.04



sn - o.oa
I.S' - 2.I I

TOTAL LENGTH (TL)

g2 = 0.03

FIR 2. VARIATION IH PTEROTLIU1EX WIDTH, ABDOMEN LENGTH. ABD\3MCNWIDTFI AND TOTAL LENGTH **OF MALE AND L''EMALE *Me ACANTJ/Ufic*urnuliis.***