Angew. Parasitol. **33** (1992), 69–78
Gustav Fischer Verlag Jena

Incidence of Mallophaga on poultry in Dehradun (India)

By M. C. TRIVEDI, A. K. SAXENA and B. S. RAWAT

From Department of Zoology, Pt. L. M. S. Government Postgraduate College, Rishikesh (Dehradun), India

Received: March 14, 1991 (revised version: August 8, 1991)

Contrary to the belief of most poultrymen that the Mallophaga are harmless creature, present researches have shown that they are not only responsible for reducing the vitality and productivity of poultry birds but some of them are also able to act as reservoir and transmitter of infectious strains. DERYŁO (1974a & b) has indicated the economic harmfulness of some species of mallophaga.

ANSARI (1943) casually mentioned about the prevalence of certain species while making taxonomic studies on the Mallophaga occurring on poultry birds of Punjab (India). AGARWAL & SAXENA (1979) noted the incidence of one louse, *Lipeurus lawrensis tropicalis* PETERS while studying its seasonal dynamics on the poultry birds of Varanasi (India). However, there had been no serious attempts to study the prevalence of different poultry lice on poultry birds of any Indian locality.

The present paper furnishes information on the incidence and relative intensity of eight Mallophaga species (3 Amblycera and 5 Ischnocera) occurring on poultry birds belonging to 15 different localities of Dehradun (India).

Materials and Methods

1,249 birds from 15 different localities in Dehradun region were examined to record the incidence and relative intensity of different mallophagan species. Most of the birds examined were White Leghorns, a few were of the Rhode Island Red and "Desi" breed. The birds's legs were tied with the help of thick thread. Individual feathers were deflected with forceps/fingers to record the presence of lice. A magnifying lens was used also.

The need of a coding system to evaluate the louse population on a live bird is a must and more often caused problems to the workers. Several workers (PARMAN et al. 1928; CREIGHTON et al. 1943; 1947; TELFORD 1944; ALICATA et al. 1946; 1947; WARREN et al. 1948; EDGAR et al. 1949; EDGAR & KING 1950; MOORE 1952; MOORE & SCHWARDT 1954; REID et al. 1956; LINKFIELD & REID 1958; RAFFENSPERGER 1958) have used different criteria from this point of view. HARSHBARGAR & RAFFENSPERGER (1961) have analysed the previous systems statistically to determine their accuracy and then proposed a 6 point system; (0) no lice seen during 1 minute interval, (1) 1–25 lice seen during 1 minute interval, (2) 26–50 lice seen during 1 minute interval, (3) 51–75 lice seen during 1 minute interval, (4) 76–100 lice seen during 1 minute interval and (5) 100–125 or more lice during 1 minute interval. He found his system to be more accurate.

DERYŁO (1974a) suggested slight modification into the above system. In the present study the coding system of HARSHBARGAR & RAFFENSPERGER (1961) has been adopted along with the modifications proposed by DERYŁO (1974a).

The numerical state of *Menacanthus stramineus*, *Menopon gallinae* and *Menacanthus cornutus* was estimated on the basis of the number of lice to be found on abdomen, back and breast (specially near the cloacal region for *M. stramineus*, on the covert feathers of tibial-hip region and abdomen for *M. gallinae* and under the bird's wing as well as back for *M. cornutus*). *Goniodes dissimilis* and *Goniodes gigas* infestation was observed on the basis of lice to be found on back while *Goniocotes gallinae* on the basis of back and abdominal feathers. *Lipeurus caponis* populations were quantitatively estimated by counting the lice present on lower surface of wing feathers, tail and neck while *Lipeurus lawrensis tropicalis* was counted on nape and neck feathers and also on wings.

The nature of association between 6 combinations of 4 species of lice were analysed by Chi square and then attempts were made to establish the degree of association. COLE (1949) provides a method of measuring the amount of interspecific association between pairs of sp. By use of his coefficient, it is possible to express the positive or negative association of 2 sp. beyond that which would occur if the species were randomly distributed (WARD 1957). For computing COLE's coefficient of association, the data were set up in 2 × 2 table as follows:

	Species B		
	Present	Absent	
No. of times present Species A	a	b	a + b
No. of times absent	c	d	c + d
	a + c	b + d	a + b + c + d = n

where:

a – species A and B both present;
b – species A present B absent;
c – species A absent B present;
d – species A and B both absent.

The coefficient of association, with its standard error; where ad ≥ bc is –

$$C \pm {}^{\circ}C = \frac{ad - bc}{(a + b)(b + d)} \pm \sqrt{\frac{(a + c)(c + d)}{n(a + b)(b + d)}}$$

In the present studies attempts were made to estimate the expected numbers of poultry birds to be parasitized by 0, 1…6 species by using Poisson distribution, as suggested by WARD (1957). In addition, trend value has also been calculated by an equation of straight line using Least square method. Furthermore, attempts were made to determine multiple correlation coefficient (R 1.23) with the lice incidence rate as dependable variable and mean monthly temperature and mean monthly relative humidity as indepent variables. The same were compared with r 12.3 (partial correlation between monthly incidence rate and mean monthly temperature by keeping R.H. silent) and r 13.2 (partial correlation between monthly incidence rate and mean monthly R.H. eliminating the effect of temperature). The analysis of partial correlation is of great significance in case of field studies where most of the phenomenon have multiple causations. A number of variable are in operation at the same time and their impacts cannot be studied in isolation as is done in physical and experimental sciences where the variables can be controlled and the effect of each variable can be studied separately. In partial correlation analysis the effect of the independent variables other than the one which is being studied are not ignored as is done in case of simple correlation. On the other hand multiple correlation coefficient give the effect of all the independent variable on a dependent variable.

Observations

Out of 1,249 poultry birds examined in 15 localities of Dehradun region, 743 (59.5%) were found infested with one or other species of Mallophaga. 84 of the total examined birds were male. The incidence of lice upon males was 60.71% and on females 59.4%. Thus, there was no major difference between the incidence of these ectoparasites on the 2 sexes.

Menopon gallinae was found to be the most common louse sp. infesting poultry birds of this area. It was recorded from 44.7% of the birds examined and narrowly followed by *Menacanthus cornutus* (40.4%). *Menacanthus stramineus* could be recorded from 26.2% of the examined hosts. Among ischnocerans *Goniocotes gallinae* showed maximum incidence rate (19.2%). *Goniodes dissimilis* and *Lipeurus caponis* ranked next (14.3% and 13.8%, respectively). *Lipeurus lawrensis tropicalis* had quite low incidence rate (9.2%) while *Goniodes gigas* was found to be the least common mallophagan sp. (4.8%).

The amblyceran species (viz. *M. gallinae, M. cornutus* and *M. stramineus*) have been collected from all the 15 localities covered during present investigation. Among ischnocerans, *G. gallinae* had wide occurrence (being absent from only 2 localities) while *G. dissimilis* was

recorded from 9 localities. Maximum incidence of these sp. was observed in Virbhadra. *L. lawrensis tropicalis, L. caponis* and *G. gigas* were collected from 5, 6, and 2 localities respectively being maximally present in Dehradun proper.

The monthly incidence of different species during the year 1988 have been shown in the Fig. 1. An attempt has been made to establish simple, multiple and partial correlation between monthly incidence of individual species, mean monthly temperature and mean monthly

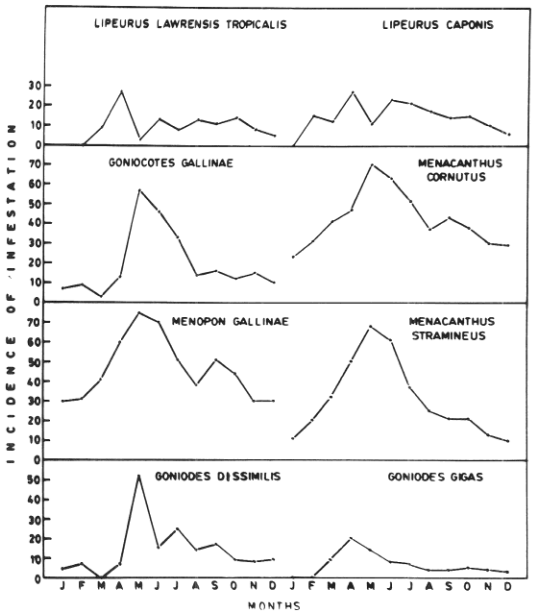

Fig. 1. Monthly incidence (percentage) of eight phthirapteran species upon the poultry birds of Dehradun during the year – 1988.

relative humidity. Except in case of *G. gigas* moderate correlation (+ve) has been found between incidence and temperature. However, such a correlation does not exist with relative humidity as value of r remained very low (except in case of *L. caponis*). An analysis of multiple and partial correlations (by keeping R.H. silent) indicates that temperature seems to play a dominant role in affecting lice incidence. On the other hand role of R.H. seems to be indicisive (except in case of *M. gallinae* and *M. stramineus*). It may be noted that mean monthly R.H. did not vary too much during the period of study in this area (44 to 76) to cause appreciable change in the incidence. It may be presumed that temperature variation (between 14 to 30 °C) may be strong enough to affect lice incidence along with other factors. In case of *G. dissimilis, G. gallinae, M. gallinae, M. stramineus* and *M. cornutus* the maximum inci-

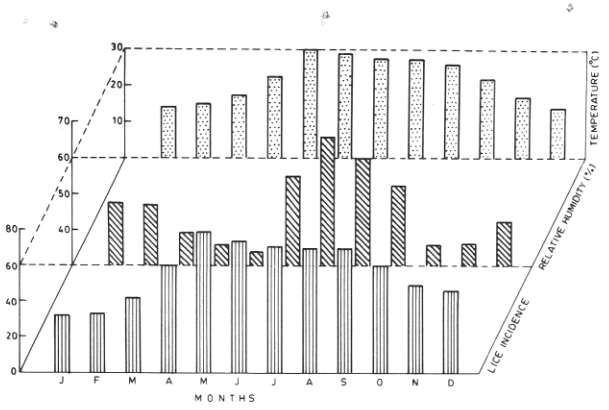

Fig. 2. The overall lice incidence, mean monthly R. H. and mean monthly temperature during different months of the year – 1988.

dence rate has been recorded during the period of maximum temperature and minimum R.H. (May) while in case of rest three phthirapterans viz. *L. lawrensis tropicalis*, *L. caponis* and *G. gigas* highest incidence occurred during the period of slightly lower temperature and more or less same R.H. (April). The mean monthly temperature, R.H. and the overall lice incidence (all species) have been shown in Fig. 2 while the relative intensity of 8 species during different months of the year has been indicated in Fig. 3. During January and February, most of the birds have shown 1–2 degree infestation while a few birds were found moderately infested. The birds started showing higher degree of infestation from the month of March. Their number continued rising till July. Thereafter, the number of birds having 1 to 3 degree infestation started dominating the scene upto September. Only a few birds could carry 3 to 5 degree infestation during October to December. The majority showed 1 to 2 degree infestation. The overall relative intensity of each species upon the poultry birds has been shown in Fig. 4.

The present study has utilised the Poisson distribution in the analysis of mallophagan populations. The observed distribution of mallophagan species per bird and the expected frequencies computed and plotted in Fig. 5. At the level of 6 species per bird for Mallophaga, there is a crossing of curves for observed and poisson values. For the number of sp. 3 to 6 a slightly greater number are encountered on an individual host than could be expected by chance. Under the observational limits and errors we can safely presume that real incidence of lice is in acquaintance with POISSON's theoretical values.

Considering the number of species as independent variable an equation of straight line $Y = 342.08 - 53.13\,X$ has been fitted on the basis of Least square method. The expected values of Y calculated on the basis of this line are given in Table 1. In the Fig. 5, the trend values have been shown by small circles. The trent line shown by dark dotted line depicts that as the number of species are increasing the number of birds is decreasing (Fig. 5).

The association is analysed between 4 mallophagan species (one ischnoceran and three amblyceran) most commonly encountered on poultry during survey work. On this basis 6 possible combinations were tested assuming H_0 as simultaneous occurrence of two sp. under

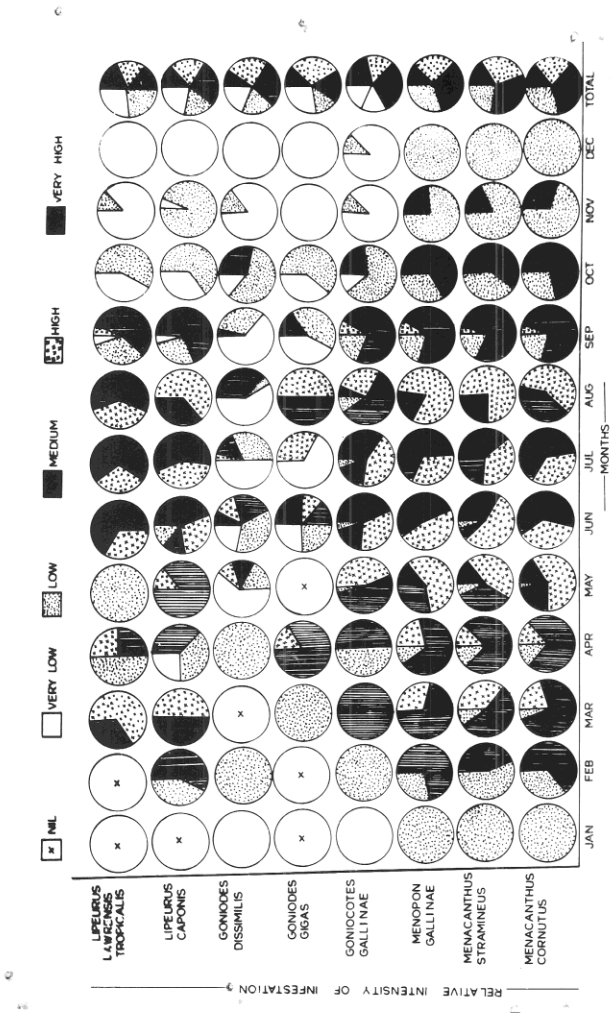

Fig. 3. The relative intensity of different species of Phthiraptera on the poultry birds during different months of the year – 1988.

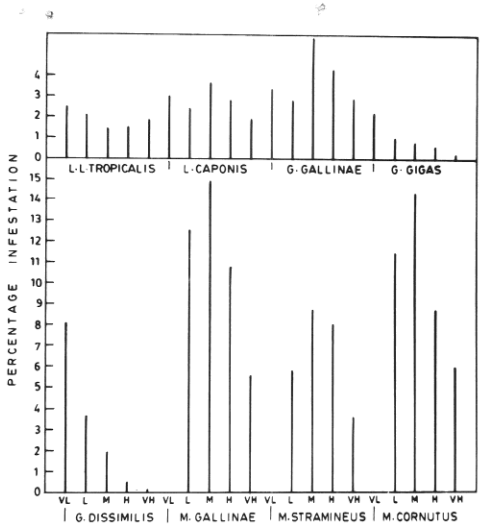

Fig. 4. The overall relative intensity of eight phthirapteran species on the poultry birds of Dehardun. VL – Very light infestation (1–25 lice), L – Light infestation (26–50). M – Medium infestation (51–75), H – Heavy infestation (76–100) and VH – Very heavy infestation (more than 100 lice seen during 1 minute examination).

consideration in a single host is by chance and H_1 as occurrence of 2 species under consideration is not independent. Since the calculated value of Chi square on the basis of sample data is much more than the tabulated value of Chi square at 1 d.f. and at .05 level of significance, therefore, H_0 is not accepted.

So it can be concluded that on the basis of sample data there occurs a definite association between simultaneous occurrence of the tested combinations. Hence attempts were made to analyse the association between 4 species of Mallophaga using COLE's coefficient of association. The results are listed in Tab. 1. It indicates that there is a positive association between the members of Mallophaga under consideration. This positive association has been in part attributed to a possible co-operative interaction between sp. and a diversity of habitat which permits several species to occur in a limited microgeographic area.

Discussion

This is the first report relating to incidence and relative intensity of lice upon the poultry birds of any Indian locality. Earlier ANSARI (1943) casually mentioned about the intensity of a few sp. while making taxonomic studies upon the mallophagans infesting poultry birds of Punjab (India). An examination of host-parasite list provided by ANSARI (1955) and LAKSHMINARAYANA (1979) indicates that *M. cornutus* has not been reported from Indian poultry

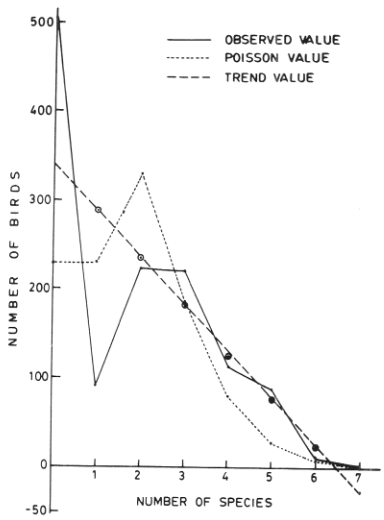

Fig. 5. Graph showing the observed and expected values of Poisson, number of different species of Phthiraptera encountered on the body of poultry bird. The observed distribution is represented by solid line while calculated Poisson is indicated by hyphenated line. Dark broken line indicates the *trend value*.

Tab. 1. Showing coefficient of association between four species of Phthiraptera parasitizing *Gallus domesticus*

Sl. No.	Pairs of Phthiraptera	C ± °C
1.	*Menopon gallinae* and *Menacanthus stramineus*	+0.197144221 ± 0.019152 05
2.	*Menopon gallinae* and *Menacanthus cornutus*	+0.456364 2 ± 0.026232645
3.	*Menacanthus stramineus* and *Menacanthus cornutus*	+0.494224 5 ± 0.038343212
4.	*Goniocotes gallinae* and *Menopon gallinae*	+0.473861 2 ± 0.052072248
5.	*Goniocotes gallinae* and *Menacanthus stramineus*	+0.407334 5 ± 0.067124511
6.	*Goniocotes gallinae* and *Menacanthus cornutus*	+0.720911 ± 0.047525266

birds. Our studies indicate that this sp. is not only present but also stands second in the order of abundance. *M. gallinae* has been found to be the most common sp. in this region. ANSARI (1943) too found it to be the most abundant on poultry birds of Punjab. Another injurious sp.

M. stramineus stands third. Thus, these 3 amblyceran sp. are the commonest kind of lice found on the poultry bird of Dehradun region. The economic and pathogenic importance of *M. gallinae* and *M. stramineus* is well established. DERYLO (1974 a & b) has made attempts to review the economic harmfulness of different poultry lice. However, the role played by *M. cornutus* is yet to be investigated. Our studies indicate that it is also a haematophagous louse (like *M. gallinae* and *M. stramineus*). Among ischnoceran, *Goniocotes gallinae* has been found to be the most abundant species followed by *Goniodes dissimilis, L. caponis, L. lawrensis tropicalis* and *G. gigas* respectively. *G. gallinae* conspicuously destroys the underdown of feathers whereas other ischnocerans are responsible for varying degree of destruction of different feathers. As compared to haematophagic species these are regarded to be less harmful (DERYLO 1974 a & b).

Our studies relating to estimation of expected number of birds (by Poisson distribution) to be found parasitized by 0, 1 ··· 6 species of lice, indicate that a greater number of sp. occur on a given host than would be expected by chance. These findings are in agreement with WARD (1957) who got similar results for mallophagans parasitizing 7 birds belonging to Tinamiformes. Similarly the degree of association between the members of 4 commonly occurring sp. infesting poultry bird also resembles to the results obtained by WARD (1957) by calculating COLE'S coefficient of association between 6 species of lice infesting Tinamiformes.

The incidence of infestation of most sp. was highest in April and May. An analysis of degree of correlation between lice prevalence and 2 environmental factors indicates that temperature plays a dominant role while relative humidity has negligible effect. Moderate to high degree of correlation has been recorded between incidence rate of different phthirapteran sp. and temperature. Avian lice generally peak in summers (BOYD 1951; ASH 1960; TOULESHKOV 1965; EVELEIGH & THRELFAL 1976; AGARWAL & SAXENA 1979; MARSHALL 1981; CHANDRA 1986; CHANDRA et al. 1988). However, WOODMAN & DICKE (1954) found the incidence of *Brueelia vulgata* on sparrows to be the lowest in summer and highest in spring. There is a lot of controversy regarding the factors responsible for summer peak of avian lice. Apart from environmental factors many biological factors repartedly participate in determining seasonal incidence of lice. BAUM (1968) regarded host moulting to be the important factor causing variations in the population of Mallophaga parasitizing Blackbird *Turdus m. merula*. Role of breeding season of host has been acknowledged by FOSTER (1969) and also by BAUM (1968) and CHANDRA et al. (1988). On the other hand the nesting activity of host has been regarded as an important factor causing changes in lice population by ASH (1960); TOULESHKOV (1965) and EVELEIGH & THRELFALL (1976). KLOCKENHOFF et al. (1973) feels that changes in environment of lice caused by alternation of host's behaviour and metabolism (due to deformities or injuries) lead to increase or decrease in louse population.

Since the poultry birds are captive birds and there is no specific breeding season, so its role in the present study may be insignificant. Many factors are able to influence the moulting process in case of poultry bird (e.g. the change in feed). So, how far these factors could affect the lice incidence cannot be said with certainty. Thus, it seems that temperature plays a dominant role in the incidence of lice population.

Acknowledgements

Authors are thankful to the Principal, Pt. L.M.S. Govt. P.G. College, Rishikesh (Dehradun) for providing laboratory facilities; to Dr. K. V. LAKSHMINARAYANA, Z.S.I., Southern Regional Station, Madras and to Dr. ROGER D. PRICE, U.S.A. for the valuable help in identification of species; to Council of Scientific and Industrial Research, India for providing financial help to Dr. A. K. SAXENA vide project No. 38/718/88-EMR II.

Summary

The order of abundance of different mallophagan species on poultry birds in Dehradun (India) has been found to be *Menopon gallinae* > *Menacanthus cornutus* > *Menacanthus stramineus* > *Goniocotes gallinae* >

Goniodes dissimilis > *Lipeurus caponis* > *Lipeurus lawrensis tropicalis* > *Goniodes gigas*. The intensity of these species upon 1249 birds has been recorded by coding system. The correlation between the monthly incidence of different species and environmental temperature as well as R.H. has been recorded. The degree of association between four most commonly occurring combinations has also been analysed.

Zusammenfassung

Die Häufigkeit der Mallophagen auf Haushühner in Dehradun (Indien)

Die Reihenfolge der Abundanz verschiedener Mallophagenarten war: *Menopon gallinae* > *Menacanthus cornutus* > *Menacanthus stramineus* > *Goniocotes gallinae* > *Goniodes dissimilis* > *Lipeurus caponis* > *Lipeurus lawrensis tropicalis* > *Goniodes gigas*. Die Intensität dieser Arten auf 1249 Hühnern wurde mit einem Schlüsselsystem (coding system) erfaßt. Der Zusammenhang zwischen der monatlichen Häufigkeit der verschiedenen Arten und der Umgebungstemperatur sowie der Luftfeuchtigkeit wurde dargestellt. Ferner wurde das Ausmaß der Verknüpfung zwischen den vier am häufigsten vorkommenden Kombinationen analysiert.

References

AGARWAL, G. P.; SAXENA, A. K. (1979): Studies on seasonal dynamics of *Lipeurus lawrensis tropicalis* PETERS (Phthiraptera: Ischnocera) infesting poultry birds. – Z. ang. Entomol. **88**: 470–476.

ALICATA, T. E.; HOLDAWAY, F. G.; QUISENBERRY, J. H.; JENSEN, D. D. (1946): Observations on the comperative efficacy of certain old and new insecticides in the control of lice and mites on poultry. – Poultry Sci. **25**: 376–380.

– KARTMAN, L.; NISHIDA, T.; PALAFOX, A. L. (1947): Efficacy of certain sprays in control of lice and mites on chickens. – J. econ. Entomol. **40**: 922–923.

ANSARI, A. R. (1943): Mallophaga found on the domestic fowl, *Gallus domesticus* LINN. in Punjab. – Indian J. Entomol. **5**: 129–142.

– (1955): Synoptic table for the determination of Mallophaga infesting the domestic fowl *(Gallus gallus domesticus)*. – Indian J. Entomol. **17** (2): 245–270.

ASH, J. S. (1960): A study of Mallophaga of birds with particular reference to their ecology. – Ibis **102** (1): 93–110.

BAUM, H. (1968): Biologie und Ökologie der Amselfederläuse (Biology and ecology of feather lice of blackbirds). – Angew. Parasitol. **9**: 129–175.

BOYD, E. M. (1951): A survey of parasitism of starling *Sturnus vulgaris* L. in North America. – J. Parasitol. **37**: 56–84.

CHANDRA, S. (1986): Studies on Ecology of Phthiraptera of Common Myna, *Acridotheres tristis* and various organ systems of *Menacanthus eurysternus* (Phthiraptera: Amblycera). – Ph.D. Thesis, Banaras Hindu University.

– AGARWAL, G. P.; SINGH, S. P.; SAXENA, A. K. (1988): Seasonal variations in the populations of two ischnoceran phthirapterans infesting common Myna, *Acridotheres tristis*. – J. Zool. Res. **1** (2): 105–108.

COLE, L. C. (1949): The measurement of interspecific association. – Ecology **30**: 411–424.

CREIGHTON, J. T.; DEKLE, G. W.; RUSSEL, J. (1943): The use of sulfur and sulfur compounds in the control of poultry lice. – J. econ. Entomol. **36** : 413–419.

– HETRICK, L. A.; HUNT, P. T.; DUNEAN, D. U. (1947): The application of chlorinated hydrocarbons to the soil and roosts effectively controls lice on poultry. – Poultry Sci. **26**: 674–675.

DERYŁO, A. (1974a): Studies on the economic harmfulness of Mallophaga (I). Effect of lice infestation on the health of chickens and Turkeys (in Polish). – Med. Wet. **30** (6): 353–357.

– (1974b): Studies on the economic harmfulness of Mallophaga (II). Influence of lice infestation on egg laying and hatching in hens (in Polish). – Med. Wet. **30** (7): 406–410.

EDGAR, S. A.; WALSH, W. L.; JOHNSON, L. W. (1949): Comparative efficacy of several insectisides and methods of application in the control of lice on chickens. – Poultry Sci. **28**: 320–338.

– KING, D. F. (1950): Effects of the body louse, *Eomenacanthus stramineus*, on mature chickens. – Poultry Sci. **29**: 214–219.

EVELEIGH, E. S.; THRELFALL, W. (1976): Population dynamics of lice (Mallophaga) on auks (Alcidae) from Newfoundland. – Can. J. Zool. **54**: 1694–1711.

FOSTER, M. (1969): Synchronised life cycle in orangecrowned Warbler and its mallophagan parasites. – Ecology **50**: 315–323.

HARSHBARGAR, J. C.; RAFFENSPERGER, E. M. (1961): An evaluation of coding system for estimating populations of the shaft louse, *Menopon gallinae*. – J. econ. Entomol. **54** (1): 74–76.

KLOCKENHOFF, H.; RHEINWALD, G.; WINK, M. (1973): Mallophagenbefall bei Vögeln. Massenbefall als Folge von Schäden an den Wirten. – Bonn. zool. Beiträge **24**: 122–133.
LAKSHMINARAYANA, K. V. (1979): A synoptic list of Mallophaga. – Rec. Zool. Surv. India **75**: 39–201.
LINKFIELD, R. L.; REID, W. M. (1958): Newer acaricides and insecticides in the control of ectoparasites of poultry. – J. econ. Entomol. **51**: 188–190.
MARSHALL, A. G. (1981): Ecology of ectoparasitic insects. – London (Academic press).
MOORE, S. (1952): Control and eradication of chicken lice with lindane. – Poultry Sci. **31**: 444–447.
– SCHWARDT, H. H. (1954): The control of external parasites of chickens in New York State. – Poultry Sci. **33**: 1230–1237.
PARMAN, D. C.; ABBOT, W. S.; CULVER, J. J.; DAVIDSON, W. M. (1928): Ineffectiveness of internal medication of poultry for the control of external parasites. – U.S. Dept. Agric. Techn. Bull. **60**.
RAFFENSPERGER, E. M. (1958): The effects of Dow ET-57 on chicken shaft louse infestations. – J. econ. Entomol. **51**: 558–559.
REID, W. M.; LINKFIELD, R. L.; LEWIS, G. (1956): Limitation of malathion in northern fowl mite and louse control. – Poultry Sci. **35**: 1397–1398.
TELFORD, H. S. (1944): Chicken louse control. – Soap sanitary chemistry **20**: 113–139.
TOULESHKOV, K. (1965): Mallophaga (Insecta) ectoparasites on starling (*Sturnus vulgaris* L.). – Izv. Zool. Inst. Akad. Nauk SSSR **19**: 175–187.
WARD, R. A. (1957): A study of host distribution and some relationships of biting lice (Mallophaga) parasitic on birds of the order Tinamiformes. – Ann. Entomol. Soc. Am. **50**: 452–459.
WARREN, D. C.; EATON, R.; SMITH, H. (1948): Influence of infestation of body lice on egg production in the hen. – Poultry Sci. **27**: 641–642.
WOODMAN, W. J.; DICKE, R. J. (1954): Population fluctuations of the mallophagan parasite, *Brueelia vulgata* (KELOGG) upon the sparrows. – Trans. Wis. Acad. Sci. **43**: 133–135.

Author's address: Dr. A. K. SAXENA, Dept. Zoology, Pt. L. M. S. Govt. P. G. College, Rishikesh (Dehradun), Pin Code: 249 201 - India.

EICHLER, Wd. (1991): **Umweltgifte in unserer Nahrung und überall**/Ein Kompendium aktueller Umweltgefahren und Umweltsünden. 2. Aufl. von „Gift in unserer Nahrung/Die Brisanz der Umweltgifte in Nahrungsketten "; neu bearbeitet und durch neue Kapitel vermehrt. – Greven (Kilda Verlag Fritz Pölking); 261 S., 56 Abb., 3 Tab., 5 S. Lit.; brosch. 39,80 DM. – EICHLERS „Giftbuch" – wie er es selbst nennt – ist neu herausgekommen. Es ist gegenüber der 1. Aufl. (1982; vgl. Angew. Parasitol. **24**: 121, 1983) erheblich erweitert (um 86 S. und 18 Abb.) und angemessen und interessant aktualisiert worden. So liegt ein zeitgemäßes, überaus wertvolles, nützliches und aufrüttelndes Buch vor, spannend geschrieben, vieles enthüllend. Das Buch konnte seinerzeit in der DDR nicht erscheinen, und dem Autor nahm man es übel, daß er es „im Westen" herausbrachte. Bezeichnend war in diesem Zusammenhang, daß es bald zu einer russischen und einer polnischen Ausgabe kam. Zeitgemäß ist die neue Ausgabe, weil sie zwischen den Zeilen der 1. Aufl. verborgene Geheimnisse lüftet (in erster Linie Mißstände in der DDR-Zeit betreffend) und weil der didaktisch geschickt angeordnete mosaikartige Aufbau aus nunmehr 101 kurzen Kapiteln 18 neu aufgenommene enthält. Vorteilhaft für die Benutzung ist, daß die kleinen Kapitel jetzt in größeren Komplexen zusammengefaßt sind: Allgemeines (darunter die für den Parasitologen wichtigen Kapitel „Tropenkrankheiten und Insektenbekämpfung" sowie „Tierseuchen und Insektenbekämpfung"); Quecksilber; DDT; Andere Pestizide; Verschiedene Metalle; Luftverschmutzung; Fungizide, Herbizide und Tenside; Weitere Problemsubstanzen; Sonstige Komplexe; Grenzwertprobleme; Wasser und weitere Probleme; Philosophische Konsequenzen. Neue Kapitel sind: „DDT wirkt wie eine Droge", „Anglerblei und Bleischrot", „Die Franklin-Story", „Waldsterben", „Amazoniens Regenwälder", „Spraydosen und Ozonloch", „Das Gülleproblem", „Weinpanscherei mit Diethylenglykol", „Desorption von Pestiziden in Innenräumen", „Elektrische Felder in der Wohnung", „Tschernobyl und die Energiekrise", „Die Fasanen-Story", „Fortpflanzungsschäden durch Luftverschmutzung", „Allergie und Umweltgifte", „Rückgang im Pflanzenschutzmittelverbrauch", „Das Robbensterben von 1988 in der Nordsee", „Formaldehyd", „Der Tütenmilchskandal" und „Die Silberlinden-Story". Das Buch ist wirklich das, als was es im neuen Untertitel ausgewiesen wird: „Ein Kompendium aktueller Umweltgefahren und Umweltsünden". Es ist für breite interessierte Kreise ausgesprochen nützlich durch einen neu aufgenommenen Ratgeber mit Hinweisen und Ratschlägen für den Verbraucher, der in Form alphabetisch geordneter Stichwörter gestaltet ist (23 S.)

K. ODENING (Berlin)