INTRODUCTION
Allee et al., (1961) suggested that ecology depends on many phases of biology, in other words the subsience of biology and physical sciences are dependent upon the influence of biology. So the study of ecology and physiology may lead to an understanding of the biology of an organism or a population.

The ecological aspects of lizards have been investigated by a number of workers in Western countries (Cole, 1943; Stebbins, 1944; Smith, 1946; Oliver, 1946; Morris, 1949, 1953; Pitch, 1954, 1955, 1956, 1958; Pearson, 1954; Ruibal, 1957, 1961; Silstead, 1957; Duellman and Duellman, 1959; Inger, 1959; Gogger, 1960; Duellman, 1960; Collette, 1961; Mount, 1961; Ruibal and Williams, 1961; Hirth, 1963a, b; Mayhew, 1963a, 1964a; Harris, 1964; Nielsen and Lawson, 1964 and Bustard, 1965a, b). Comparatively very little work has been done on lizards of India (P. Annandale, 1913; Dodsworth, 1915; Smith, 1915; Asana, 1931; Das and Pas, 1932; Mahendra, 1936; Salim Ali, 1943 and Ganapati and Rajyalakshmi, 1958). The activity cycles of lizards are governed and controlled by thermoregulatory needs and interrupted by the ecological factors (Cowles and Bogert, 1944; Bogert, 1949a; Gable, 1946; Canant, 1950; Pitch, 1956, 1958; Hirth, 1963b, and many others). Only within the last few years thermoregulation in tropical lizards has been investigated (Bogert, 1949b; Pitch, 1954; Edgren, 1955; Lowe and Vance, 1955; Saint Girons and Saint Girons, 1956; Ganapati and Rajyalakshmi, 1958; Stebbins and Makin, 1958; Inger, 1959; Wilhoft and Anderson, 1960; Ruibal, 1961; Wilhoft, 1961; DeWitt, 1963; Hirth, 1963b, Soule, 1963; Heath, 1964b; Licht, 1965; Licht et al., 1966 and Bustard, 1967). It has been the general conclusion of these
workers that selection of habitat, behaviour and thermal sensitivity are closely interrelated.

Since temperature is perhaps the most important limiting factor in the ecology of an ectotherm (Cole, 1943; Gowles and Bosert 1944; Gowles, 1958; Bosert, 1959; Heath, 1962a, b; Jayhow, 1962; and Drattström, 1965) special emphasis has been placed on temperature of Aneiva quadrilineata and Basiliscus vittatus and that of the physical environment (Birk, 1965b).

**BEHAVIOUR**

The social behaviour of lower vertebrates includes four general activities (1) aggregation (2) dominance and territory (3) sexual behaviour and (4) parental care (Greenberg, 1943). Many species of banded geckoes are solitary and others show no aggressiveness (Greenberg, 1943). Nevertheless, these four elements of social organisation might be traced through the vertebrate series (Greenberg, 1943). The broad phylogenetic implications of such natural history data has been reviewed by Noble (1939 as cited by Greenberg (1943). An undescribed type of burrow of Choridophorus sexlineatus and Barkidja insularis was observed by Edgren (1955) and Ganapati and Rajyalakshmi (1958) respectively. Burrows were interpreted as thermoregulatory in nature, lizards burrowing to escape direct radiation. In the life history and behaviour of Chamaeleo hohnelli, changes in colour and shape were important in behaviour, and a form of ceremonial fighting
has been developed (Bustard, 1965b). He also observed the social behaviour of this animal. The head jerking behaviour, which has not been previously described for the Chamaeleonidae, was an important feature. The young showed the general behaviour of head jerking similar to that of adults (Bustard, 1965b).

**SIZE** (Size of Home-Range and Center of Activity)

Fitch (1955) studied the home-range ecology of *Ameiva obsoletus*. Although a skink might spend days or even weeks in the same burrow without emerging, this does not constitute a permanent home base, as lizard would eventually move to another such burrow. Most shifts within an area, familiar to the skink tend to occupy as home-ranges, more than 50 feet but less than 150 feet in diameter. Shifts to new home-ranges occur from time to time. Tinkle et al., (1962) studied the home-range ecology of *Uta stansburiana*. Many lizards were captured 5 or more times so that fairly reliable estimates of home-range size were obtained. The home-range averaged 0.06 acre in adult males, 0.02 in adult females and 0.01 in juveniles. This was smaller than the averages reported for other North American lizards. The home-range of males in the breeding season showed little or no overlap, suggesting that the males displayed territoriality throughout the home-range. The home-range and center of activity of *A. quadrilineata* and *B. vittatus* overlapped extensively on the beach (Hirth, 1963b). Several workers (Fitch, 1940; Stebbins, 1944 and Blair, 1960) showed that within the home-range there was a center of activity from which the lizards
make occasional excursions farther away. In S. sexlineatus the
territoriality was not observed, home-ranges overlapped broadly
and there was no observed defence of a particular area (Bellis,
1964). Pitch (1958) reported a lack of territoriality in this
species in Kansas, many of both sexes inhabiting the same area.
Similar results were found by Carpenter (1959) in a Southern
Oklahoma population. Short chases were observed especially dur-
ing June, but these were probably part of the aggressive behaviour
in establishing dominance rather than activities in a defence of
home site. These chases were discussed by Carpenter (1960).

LOGOMOTION

Neither Ameiva nor Basiliscus attained the high running speed
characteristic of some lizards (Hirth, 1963b). Ameiva always ran
quadrupedally, usually in a straight line, with the tail arched
over the back, while young Basilisk ran bipedally, at a slower speed
and over a more irregular course. In his studies of bipedal
lizards, Snyder (1949, 1954) found that the weight of the tail,
used as a counter balance, was the most important single factor in
the capacity to run on two legs. He also demonstrated the impor-
tance of tail length, and found that adult B. basiliscus was unable
to maintain the bipedal gait after the distal third of the tail
was removed. Similar results were obtained in adult B. vittatus
(Hirth, 1963b).
The stomach contents and feeding behaviour of lizards have been investigated by number of authors (Kallion, 1920; Beebe, 1945; Pitch, 1954; 1955; Jessauer, 1955; Inger, 1959; Hirth, 1963a, b; Lee et al., 1963 and Bellis, 1964). In these observations the low number of primarily flying insects in the diet was noteworthy. Hirth (1963a) while studying the food of *H. plurifrons* indicated that small lizards were primarily insectivorous, and that larger lizards ate both vegetation and insects. The same author (1963b) in his study on food and feeding behaviour of *A. quadrilineata* and *P. vittatus* found that direct intergenetic competition for food was reduced by different methods of feeding. Both *Ameiva* and *Basiliscus* depended chiefly on sight to obtain food. The probing of *Ameiva* with its snout, however, suggested that the sense of smell was also important. This supported Oliver's (1955) statement that the long-tongued teiids relied more on the tongue and Jacobson's organ in foraging, while the iguanids relied primarily on vision. The studies of Lee et al., (1963) showed the relative independence of *Amphibolurus barbatus* on temperature. Certain behaviour patterns, such as feeding and threat display, were advantageous when the lizards spend long periods basking to preferred temperatures in the morning.

**GROWTH AND LONGEVITY**

The growth and longevity of lizards has been studied by many
workers (Pitch, 1940; Cagle, 1946; Crosman, 1956; Smith, 1957; Fox and Dessauer, 1958; Hirth, 1963b and Bellis, 1964). The growth rate was nearly linear in the males of green Anolis that responded well to experimental conditions (Fox and Dessauer, 1958). Hirth (1963b) studied the growth and longevity in A. quadrilineata and B. vittatus. In O. sexlineatus, 53 rates were determined for males, in six size classes and 25 for females in four classes. The mean growth rate in females was slightly higher than in males (Bellis, 1964).

Ontogenetic Changes in Length of Tail

Hirth (1963b) studied the ontogenetic change in tail length and he correlated it with assumption of bipedal locomotion.

Reproductive Ecology

Size at Sexual Maturity

The size at sexual maturity in lizards has been demonstrated by Breckenridge (1943); Rodgers and Memmeler (1943); Cagle (1950); Pitch (1954, 1955, 1956, 1958); Crenshaw (1955); Dessauer (1955); Gordon (1956); Tinkle (1959, 1961); Telford (1959); Blair (1960); Hirth (1963b) and Mayhew (1965, 1966a, b). Dessauer (1955) observed that the testes and ovaries in Anolis carolinensis were smallest in late September and October. Testes growth began in November and the organs were heaviest between February and June. U. stansburiana matured at the age of one year or less (Tinkle, 1961). Sexual maturity in A. quadrilineata and B. vittatus was
reached in less than an year (Nirth, 1963b). In *Bus scoparia*
sexual maturity was reached during the second summer following
hatching (Haynew, 1966a). In *B. notata*, the adult testes volumes
changed markedly during the year, generally reaching the maximum
size in May (Haynew, 1966b).

**BREEDING**

The breeding habits of *Calotes mystaceus* and *B. carolinensis*
were observed by Smith (1915) and Hamlett (1952) respectively.
In *A. quadrilineata* and *B. vittatus*, the breeding might take place
all round the year, but the largest number of young lizards of
both kinds were seen in August and September (Nirth, 1963b).

*U. notata* were autopsied to determine the reproductive cycle
(Maynew, 1966b). Breeding activity in males and the emergence of
juveniles were delayed following dry winters until the requisite
amount of food could be acquired (Maynew, 1966b). In *U. scoparia*,
the reproductive activity varied from year to year due, at least
in part, to the amount of rainfall that occurred in preceding winter.
Following dry winters, reduced testis size, fewer eggs in ovaries,
decreased numbers of potentially breeding males and females, and
lack of juveniles at the end of the breeding season were observed
(Maynew, 1966a).

**COURTSHIP AND MATING BEHAVIOUR**

The mating behaviour of lizards, its bearing on the theory
of sexual selection and experiments on the breeding habits of
Ameiva and Chameleo and Ophisaurus have been studied by Noble and Bradley (1933) and Noble and Mason (1933) respectively. While observing the courtship of Varanus monitor, Salim Ali (1943) found that the lizards were engaged in an "all in" wrestling match and many of their grip catches and throws were surprisingly human. The main difference in the mating behaviour of A. fasciatus (Fitch, 1954) and A. Laticens (Coin, 1957) seemed to lie in the length of the pre- and post-copulatory phases. Apparently in A. fasciatus the male attempted to grasp the female almost immediately after he found her. Soon after copulation the male followed his partner. But according to Fitch, the association usually does not last more than a few minutes. Klein (1931) described copulation in C. chamaeleon; Trench (1912) wrote notes on the mating behaviour of C. zeylanicus. Bustard (1963c) observed the mating of Microsaura ventralis. According to the literature the male held the female with all its four limbs. As per Firth (1963b), during the mating season the flanks of most of the males of Ameiva became greenish-blue, but no such colour changes were observed in the females. This was similar to that of A. exsul, but differed from that of A. chrysolaema (Noble and Bradley, 1933). Apparently, A. chrysolaema relinquished its hold on the neck and grasped the flank of the female just before coitus.

EGGS AND HATCHING

The various aspects of the eggs and hatching in lizards were observed by number of authors (Annandale, 1912; Lowesley, 1930;
Cunningham and Hurwitz, 1936; Cagle, 1940; Shaw, 1943, 1952, 1954, 1960, 1963; Nethew, 1944; Underwood, 1944; Clark, 1946; Anonymous, 1953; Bartoff, 1956; 'acer, 1956; King, 1959; Mustard, 1963a, b, c, 1964, 1965; Mirth, 1963b; Nayhew, 1963b; Chapra, 1964 and Milhoft and Reiter, 1965). The above authors observed the number of eggs per clutch, the clutch numbers, the size of the eggs, the egg laying and the time taken for hatching in various lizards.

THE POPULATION DENSITY AND DISTRIBUTION

The populations of lizards have been studied by many authors (Cagle, 1946; Smith and Carlos, 1955; King, 1959; Kahn, 1960; Dgdaakov, 1961; Tinkle, 1961; Mirth, 1963b and Bellis, 1964). Many of the above authors reported that a collective group of animals of the same or closely associated species occupying a particular space, had many characteristics and that the influence of different ecological factors acted on the density of a population both in the field and in the experimental studies. The period of greatest activity in the population of Hemidactylus turcicus was found to be 1-3 hours after sun set (King, 1959). Gravid females were found throughout a five month period (April through August). Kahn (1960) observed the effect of fire on a population of S. occidentalis. Adult female lizards were little affected by fire due to the insulating qualities of soil while the young seemed to fare less well. Consequently because of lessened population pressure, lizards from adjacent unburned areas moved into burned parts. Density of the lizard population in various segments and its range, were
studied by Bogdakov (1961). The gray, Turkestan and Caspian Geckos of Central Asia prefer loess cliffs, where they establish colonies in great density. The Turkestan gecko dominates in locales where these species coexist, occupying the best biotopes and displacing the Caspian gecko into rodent burrows. *Agama himalayana* was displaced from favourable biotopes by *A. lehmanni* while *Habuva aurata* displaced the *Juncos sp.* (Bogdakov, 1961).

Tinkle (1961) studied three populations of *U. stansburiana* by mass sampling over a two year period. He showed that the estimation of natality at the population level could be fairly accurately made by knowing the sizes of females in the population and verified by field experiments. Density estimates over a period of three years of *A. quadrilineata* and *B. vittatus* indicated that populations remained fairly stable (Hirth, 1963b). As per Bellis (1964) the density of 2.45 of *G. sexlineatus* per 100 square meters was found, assuming that no regular inhabitants of the area escaped being captured sometime during the summer. Densities of this magnitude, or even greater, were probably common in this region as habitats similar in character were provided throughout the Savannah River plant area.

**SEX - RATIOS**

The sex-ratio in *U. stansburiana* was not significantly different from 50:50 in any population, age group or season. However, since males reached a larger size than females, samples containing predominantly large lizards might be as much as 90% male (Tinkle, 19
In *A. quadrilineata* and *B. vittatus*, there were no significant differences in numbers of juvenile males and females at any time during the study. The sex-ratio was 1:1. Among adults the females far exceeded the males (Mirth, 1963b). The sex-ratio in *O. sexlinea* in the study area was 26 males : 18 females, the young not being included in this ratio. This might not be an accurate ratio as it was believed that males were more active, and hence more apt to be captured during June and July. The activity of the males when compared to the females decreased as the summer progressed (Bellis, 1964).

**PARASITES AND PREDATORS**

The only ectoparasite found on *Crotaphytus collaris*, *Gnemidophorus sexlineatus* and *A. quadrilineata* was red mite, *Trombicula alfreddugesi* (Fitch, 1956, 1958 and Mirth, 1963b). Riches (1962) noted the Acarine parasites on *Lacerta agilis*. Bovee and Telford (1962a, b, 1965) observed the protozoan parasites in *Neoseps reynoldsii*, *Sphaerodactylus notatus* and *Sceloporus* sp. Telford (1965 a, b, c, d) reported the Nematode parasites in *Klauberina riversiana reticulata*, *Sauromalus o. obesus*, *Sceloporus magister magister*, *Gerrhonotus multiscaratus*, *S. orcutti orcutti*. The same author also noted Haemosporidian parasites in *Sauromalus hispidus*, *S. varius*, *S. australis* and *S. obesus*.

Predators on *E. obsoletus* were collared lizard, blue-racer, broad winged hawk, common mole, and opossum (Fitch, 1955). Snakes
were probably the most important predators on *P. quadrilineata*
and *P. vittatus* (Hirth, 1963b).

**STUDIES REVIEWED**

**LOCOMOTOR ACTIVITY**

Studies on the locomotor activity rhythm, one of the indicator
processes often chosen for investigating the diurnal rhythms, in
different organisms have considerably contributed to the understand-
ing of the problems in this field. There is a large body of liter-
ature on activity rhythms in poikilotherms; in crustaceans
(Schallek, 1942; Roberts, 1944; Gyselman, 1957; Bennett et al.,
1957; Taylor, 1958, 1960, 1961, 1963; Bliss and Sprague, 1956 and
Bliss, 1960) in insects (Gunn, 1940; Hollanby, 1940; Cloudsley-
b, 1964; Roberts, 1960, 1962; Nowosielski, 1962; Nowosielski and
Patton, 1963 and Nowosielski et al., 1964) in arachnids (Gopalakrishna-
Reddy, 1966) and in lizards (Park, 1938; Kayser and Marx, 1951;
Inger, 1959; Barden, 1942; Taylor, 1962; Walls, 1942; Cloudsley-
Thompson, 1961a, b, 1965; Evans, 1966 and Bustard, 1967). These
particularly add to the understanding of the nature of the rhythms
and elucidate some of the mechanisms of the "clocks" regulating
the activity cycles.

Many investigations carried out under controlled conditions
of light proved the persistence of the rhythms in continuous dark-
ness as well as in continuous illumination at least for a few
cycles. Light inhibited the activity in the lizard (Cloudsley -
Thompson, 1965), the mantid (Hoeder et al., 1960) and the cockroach, (Cloudsley - Thompson, 1960a). A disappearance of rhythm in Scapharca (Roberts, 1944), Microtus (Galhoun, 1945) and Blatta orientalis and Periplaneta americana (Cunn, 1940; Cloudsley-Thompson 1953 and Harker, 1956) has been reported. However, Roberts (1960) demonstrated the persistence of rhythms both in continuous light and continuous darkness for more than three months and suggested that it might be indefinitely persistant in cockroaches.

The changes in the period of activity rhythms was another very significant finding in the study of diurnal rhythms (Johnson, 1939; Stinson, 1960; Aschoff, 1960; DeCoursey, 1960; Hoffmann, 1960; Roberts, 1960 and Nowosielerski, 1962). The susceptibility of the rhythms to phase shifts has been documented in many publications (see Harker, 1958, 1961 and Webb and Brown, 1959) and the reversal of the locomotor activity rhythms under the reversed conditions of light reported in crickets (Nowosielerski, 1962), cockroaches (Harker, 1956), arachnids (Gopalakrishna Reddy, 1966) and in lizards (Kayser and Marx, 1951).

A very remarkable feature of activity rhythms that evoked excitement and interest among the research workers in the field of biological "clock" systems was the fact that despite the great dependence of metabolism of the organisms on temperature, the "clock" systems were generally temperature independent. Such temperature independence of the locomotor rhythms has been recently demonstrated in the crickets (Cloudsley - Thompson, 1958a), in
cockroaches (Roberts, 1960), in crabs (Taylor, 1963), in arachnids (Copalskrihna today, 1966) and in lizards (Taylor, 1962). The functional significance of this temperature independence, within at least a limited ecological range of temperature has been much emphasised.

In contrast to advances made in the study of activity rhythms in crustaceans, insects, arachnids and other organisms. The available information on lacertilia is rather random and cursory. Park (1936) obtained diurnal activity patterns in Mabuya mabuya, Basiliscus basiliscus and Anolis frenatus with aktograph apparatus, Keyser and Marx (1951) found that Lacerta agilis and L. muralis were active between 10.00 and 16.00 hours. The rhythm could be reversed by illuminating them at night and keeping the lizards in darkness during the day, but it was not found possible to introduce two peaks of activity in the 24 hours by illuminating the animals for four hours in the morning and four hours at night. Inger (1959) studied the activity of Mabuya rufus during the heat of the day, Sphenomorphus sabanus at dawn and dusk when environmental temperatures were low. Field observations on C. sexlineatus showed that, in its natural sand-dune habitat, this lizard was active only in the day-time and even then not until the sand was warmed by the rising sun. Laboratory experiments with aktograph recording apparatus confirmed this activity pattern (Barden, 1942 and Taylor, 1962) reported that under laboratory conditions, Scelophorus magister quickly adapted to regular 24 hour environmental temperature cycles.
and, after a few days, even anticipated the drop in temperature by burying itself a short time before the cold phase appeared. The response persisted up to seven days at constant temperature. In contrast, most geckos such as, *Thecodactylus ranicandus* were nocturnal although *Sphaerodactylus lineolatus* was diurnal in habit (Park, 1956). Practically in all species that have been investigated, the bulk of nocturnal activity took place before midnight and before temperatures began to drop much. Cloudsley-Thompson (1965) recorded that *Habuza quincuetaeniatus* was day active and *Parentola annularis* nocturnal under natural lighting conditions at room temperature and humidity. The rhythm persisted for several days in constant darkness and in *T. annularis* to a lesser extent in constant artificial illumination. The rhythm was not re-set by sudden temperature drops or by brief illumination after long periods in darkness but regular temperature fluctuations in darkness caused an adjustment so that *H. quincuetaeniatus* was active during warmer periods and *T. annularis* when the temperature fell. This rhythm persisted in constant temperature but the original was reassumed in natural day light and darkness.

**RESPIRATORY RHYTHMS**

Contributions on the metabolic rhythms in poikilotherms are considerable, though not extensive, adding to the large body of literature pertaining to the diurnal rhythms dealing with a variety of other biological phenomena such as colour changes, retinal pigment migration, eclosion and locomotion etc., (Harker, 1958 and
The rhythms of oxygen consumption have been investigated in the fiddler crab, Uca, (Brown et al., 1954), in Hirtius (Brown et al., 1955), in the earthworm, Lumbricus terrestris (Ralph, 1957), in the grass hopper,朗诵者 microptera (Finchman et al., 1958) in the crab, Carcinus maenas (Arudpragasam and Naylor, 1964) and in the scorpion, Heterometrus fulvipes (Gopalakrishna Reddy, 1966).

Persistent diurnal, tidal and lunar rhythms of oxygen consumption have been demonstrated in the fiddler crab (Brown et al., 1954) and in the earthworm (Ralph, 1957). Ralph (1957) while correlating the rhythm of oxygen consumption with that of motor activity, has observed the former to be not a mere reflection of the latter. Brown et al., (1954) and Arudpragasam and Naylor (1964) working on Uca and Carcinus respectively have observed greatest respiratory activity just after the greatest locomotor activity. The findings of Finchman et al., (1958) in the grass hopper, R. microptera revealed two types of individuals in the population with respect to their 24 hour rhythm of locomotor activity and oxygen consumption. Gopalakrishna Reddy (1966) studied the respiratory rhythm in the scorpion, H. fulvipes which followed nearly the same time course as that of the locomot order rhythm with a higher rate of oxygen consumption between 4.00 P.M. and 12.00 mid-night. An adaptive significance of this rhythm of respiratory activity was suggested.