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Implications and Considerations Concerning the Status, Habitat and Distribution of the Least Brook Lamprey, *Lampetra aepyptera* (Abbott) (Pisces: Petromyzontidae) in Arkansas

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IMPLICATIONS AND CONSIDERATIONS CONCERNING THE STATUS,
 HABITAT AND DISTRIBUTION OF THE LEAST BROOK LAMPREY,
LAMPETRA AEPYPTERA (ABBOTT) (PISCES:PETROMYZONTIDAE) IN ARKANSAS

The least brook lamprey, *Lampetra aepyptera* (Abbott), is described by Eddy (1969) as a small lamprey in small streams of the upper Ohio River drainage, from the Potomac to Neuse River drainages along the east coast, and in some Gulf Coastal streams. Schwartz (1959) reported that the species in West Virginia is apparently more confined to small brooks than other lampreys, and Trautman (1957) suggested that spawning occurs in Ohio in streams less than 4.6 m wide, when water temperature reached 10°C.

The species was reported by Robison (1974) as rare in Arkansas based partly on the fact that only three specimens had been collected in Arkansas at that time. *L. aepyptera* was not included in the Arkansas ichthyofauna by Buchanan (1973), but was included in a list of species most likely to be added to the state species list.

The first record of *L. aepyptera* in Arkansas was collected by Harp and Matthews (1975) from Mill Pond Branch in the South Fork of the upper Spring River, and from Piney Creek in the White River drainage. Since then, *L. aepyptera* has been reported by several researchers in north central Arkansas (Table 1).

Table 1. Recent records of the least brook lamprey, *Lampetra aepyptera* in Arkansas.

CATALOGUE #	DATE	LOCATION	# of SPECIMENS
ASUMZ 1553	27 Jan '73	FULTON CO: Mill Pond Branch	2
ASUMZ 1878	17 Feb '73	IZARD CO: Piney Creek	1
ASUMZ 4484	9 Mar '75	STONE CO: N. Sylamore Creek	2
ASUMZ 5378	10 Mar '75	FULTON CO: Hyatt Creek	1
ASUMZ 7891	2 Oct '76	RANDOLPH CO: Eleven Pt. River	1
ASUMZ 8532	25 Feb '78	LAWRENCE CO: Cooper Creek	1
ASUMZ 8892*	16 Mar '79	SHARP CO: Rock Creek	1
NLU 39424	27 Mar '78	SHARP CO: Martin Creek	3
SAU (Uncat.)	4 Apr '75	IZARD CO: Little Strawberry River Tributary	2
SAU (Uncat.)	4 Apr '75	IZARD CO: McJunkins Branch	1
SAU (Uncat.)	4 Apr '75	IZARD CO: Bull Pen Creek	1
SAU (Uncat.)	4 Apr '75	SHARP CO: Big Creek Tributary	3

(*denotes new range extension)

A single 99 mm (TL) male specimen of *L. aepyptera* was collected in Rock Creek, Sharp County, Arkansas (T.18N, R.4W, Sec. 4) during routine electroshocking operations on 16 March 1979. The collection site was a rocky shoal, with 10-15 cm of water. Further shocking produced no additional animals; however, this specimen extends the known range of *L. aepyptera* into the Rock Creek drainage of the lower Springs River. These recent records confirm Pflieger's (1975) assumption that additional collecting efforts would reveal a more extensive range than has been previously reported for the species. The record brings to 19 the total number of specimens located by the authors.

All known records of *L. aepyptera* in Arkansas are within a six-county area. Of the 19 located specimens, 15 (78.95%), were taken in Fulton, IZard and Sharp counties. At the present time, 12 watershed projects are in some stage of planning or operations within this six-county area (Ozark Foothills RC&D Council, 1977).

Watershed lakes are indicated as primary drainage solution measures in these project areas. Varying degrees of channelization, and resulting instream flow increases, are often incorporated in watershed projects (Funk, 1973), and result in decreased species diversity, reduced nesting areas and simplified food webs (Mauney and Harp, 1979).

Seversmith (1953) and Pflieger (1975) reported that during their development, ammocoetes of *L. aepyptera* were found in different environments within east coast and Missouri drainages, respectively. In each case, the larval period indicated was three years, and in each case, debris and sediment accumulations protected from the full force of stream flow were preferred larval habitat, especially in late winter and early spring. These areas would be particularly endangered during progressions on the existing watershed plan.

Robison (1974) referred to species whose "continual survival is unlikely without the implementation of protected measures" as endangered. Considering the larval habitat degradation accompanying progress on planned watershed measures, endangered status is considered warranted for the least brook lamprey should watershed activities resume within its range.

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ADDENDA

Since this manuscript went to press we have acquired additional information concerning *Lampetra aepyptera* in Arkansas. Thirteen *L. aepyptera* were collected with a standard dip net in isolated pools of North and South Sylamore Creeks in Stone County, Arkansas, on 30 March 1980 (Mike Wooten, pers. comm.). Specimens are deposited in the North Texas State University Fish Collection (NTSU MDZ#601-613). These additional specimens brings to 32, the total number of *L. aepyptera* located by the authors.

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IMMUNE RESPONSES OF RATS TO ANTIGENS OF MOLONEY LEUKEMIA VIRUS

Rats represent an attractive model for immunogenetic studies, since their major histocompatibility locus (RT1) resembles in structure the major histocompatibility locus of humans (HLA) (Gill, 1978), and since the immune responses to retroviruses that are associated with disease processes in humans resemble more closely the responses seen in rats than those seen in mice (Panem and Reynolds, 1979; Jones et al., 1978).

Brown Norway (BN) rats exhibit high antibody responses and high susceptibility to tumor induction by Moloney sarcoma virus, whereas Lewis (LEW) rats exhibit low responses and low susceptibility (Veit et al., 1977). In previous studies, control of these responses was shown to be influenced by genes linked to RT1, but an influence of other genes was also indicated (Jones et al., 1978; Veit et al., 1977). The present studies provide additional evidence that genes linked to RT1, if necessary, are not sufficient for high antibody responses when this locus is bred onto the background of a low responder strain.

The rat strains used in these studies, the sources and some of their properties are summarized in Table 1. Additional details of most strains were described by Festing and Staats (1973). Approximately equal numbers of males and females were used at three to six months of age.

Purified Moloney leukemia virus (MuLV) was obtained from the Resources Branch of the National Cancer Institute. A vaccine was prepared by treating the virus with 1:2000 formalin for 24 hrs at 4°C. Rats were immunized with vaccine by two subcutaneous and one intravenous injection at weekly intervals, and serum samples were collected one week after the last injection. Rat Moloney sarcoma tumor cells (MST) have been previously described (Jones et al., 1974). Rats were injected subcutaneously with 5×10^6 MST cells, and serum samples were collected 22 days later.

The p15, p30 and gp70 polypeptides of MuLV were prepared and labeled with ^{125}I as described (Jones et al., 1978), and radioimmunoassays for antibody conducted as described (Jones et al., 1977). Briefly, 0.3 to 0.5 ng ^{125}I labeled antigen was incubated with 5 μl rat serum, and rat immunoglobulin with bound antigen was precipitated with an excess of goat anti-rat gamma globulin. Values were corrected for specificity by tests with normal rat serum from the strain being tested.

Table 2 shows that when immunized with oncogenic virus (MuLV) or with tumor cells (MST), BN rats exhibit high antibody responses and LEW low responses. LEW-1n congenics with RT1n of BN bred on a LEW background exhibited responses similar to LEW. TO rats, which differ genetically from all of the other three strains, exhibited responses similar to BN to p30 and responses lower than BN to gp70. This shows that higher responders to p30 are not automatically higher responders to other viral polypeptides. Table 3 shows that the phenomenon observed with LEW low responses, LEW-1n congenics with RT1n of BN bred on a LEW background exhibited responses similar to LEW. To rats, which differ congenics carrying the RT1f of AS2 on a LEW background were low or non-responders to p15. LEW-1f were also low responders to gp70 when immunized with MuLV (% precipitation 3.8 ± 2.6), and LEW rats were low responders to p15, p30 and gp70 in all tests when immunized with MuLV.

The responses of BN and LEW rats to several antigens have been compared (Gunther, 1978), and in most cases LEW are high responders and BN are low responders. Responses to MuLV are an exception, since BN are high and LEW are low. The results with LEW-1n show that such responses are influenced by genes that are not linked to the major histocompatibility locus of rats, RT1. Although immune responses of several animal species including humans are controlled by immune response (I) genes linked to the major histocompatibility locus (Benacerraf and McDevitt, 1972), the present report and other studies (Doig and Chesebro, 1979) demonstrate that other genetic loci are important. While it is clear that the major histocompatibility loci (H-2, RT1, HLA) are significant, we must not become overly fascinated by these genetic regions to the extent that we tend to ignore other genetic influences which are equally significant in immune responses and in disease susceptibility. The so-called "major influences" have been explored primarily because they are the easiest to measure, but the so-called "minor influences" should also be examined.

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