SOME RECENT COLLECTIONS OF MUSSELS FROM SOUTHEASTERN MICHIGAN. – This report concerns some recent collections of mussels in the Lake Erie drainage of southeastern Michigan. Other recent records from this area are reported in van der Schalie (1970), Clarke (1973) and Clark (1977). For earlier records, see Goodrich (1932), van der Schalie (1938), and references cited in those two publications.

The streams in the study area are low gradient hardwater streams (Knutilla & Allen, 1975). Most of the streams examined are less than 20 m wide, and all are shallow (<1½ m in low water stages). Bottom types range from bedrock and cobbles to silt and clay, although sandy substrata predominate. Macrophytes are generally rare or absent.

All watersheds in this area have been greatly altered from their natural states. Land use is predominantly agricultural and urban, resulting in loads of silt, agricultural chemicals, and domestic and industrial wastes to the streams. All river systems have numerous dams, which probably act as significant barriers to fish dispersal and convert free-flowing stretches to ponded backwaters as well.

Collections were made at 26 stations (see Fig. 1) in 1976-78. Handpicking was employed, sometimes augmented by use of a garden rake or a ½"-mesh wire screen (which was particularly useful in recovering small shells). Live mussels were identified and representative shells of most species were saved.

The results (see Table 1) show relative abundances in terms of the number of live specimens that I was able to collect per hour during a period of optimal conditions. They should not be taken as quantitative, but rather as rough indices of abundance. All species have been reported previously from the State of Michigan.

Carunculina glans, Simpsoniconcha ambigua, Lasmigona complanata and *Anodonta imbecilis* (?, see Table 1) are new records for the Raisin drainage (cf. van der Schalie, 1938, and records of the Museum of Zoology, The University of Michigan [UMMZ]). The first two are of rare and spotty occurrence in Michigan, and are part of the lower Macon Creek fauna (Station 8), which comprised 18 species, including three (*C. glans, S. ambigua* and *Dysnomia torulosa rangiana*) regarded by Stansbery (1970) as endangered. The latter two may be recent invaders to the lower Raisin, along with *Carunculina parva*, which is new to the lower river (UMMZ records). Van der Schalie (1938) reported that *L. complanata* had apparently invaded the Huron River in historical times, and, along with *C. parva*, dominated impounded stretches of that river.

Many stations, particularly in the headwaters, still contain healthy mussel populations. For these places, my species lists compare very favorably with previous records (Stations 1 and 2 with Clark's (1977)

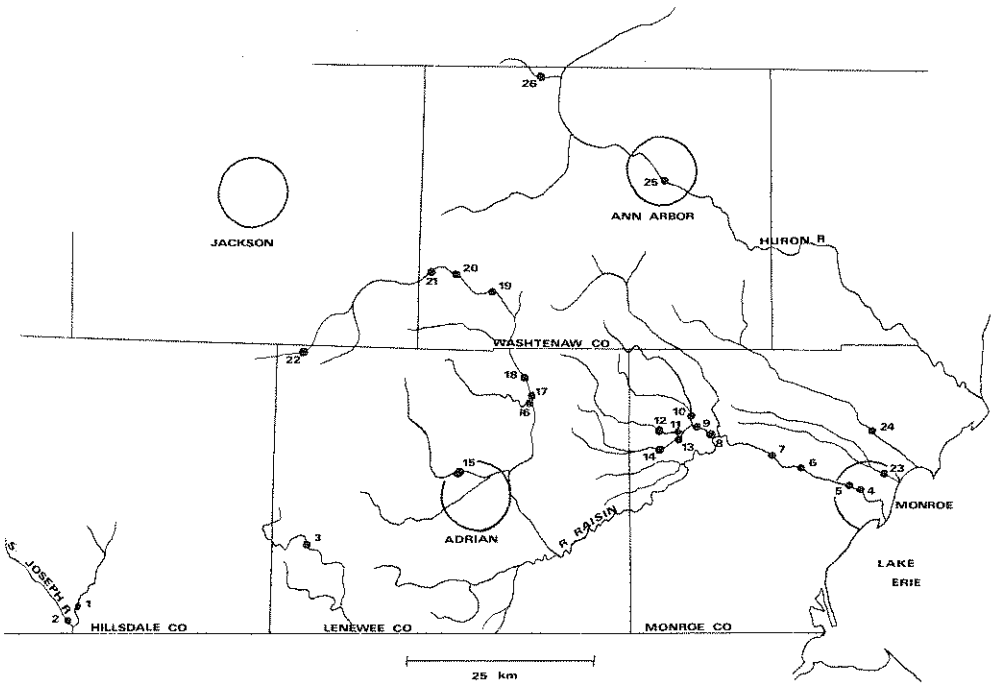

FIG. 1. Map of collecting localities in this study. Locality numbers are the same as given in Table 1.

TABLE 1. Distribution and abundance of mussels found in southeastern Michigan.

Localities[1]	Species																												
	A. costata	*C. tuberculata*	*E. dilatata*	*F. flava*	*P. clava*	*P. c. coccineum*	*A. calceolus*	*A. marginata*	*A. grandis*	*A. imbecilis*	*A. ferussacianus*	*L. complanata*	*L. compressa*	*L. costata*	*S. ambigua*	*S. undulatus*	*A. carinata*	*C. glans*	*C. parva*	*D. t. rangiana*	*D. triquetra*	*L. fasciola*	*L. r. siliquoidea*	*L. o. ventricosa*	*L. recta*	*V. fabalis*	*V. iris*	*P. fasciolare*
1. St. Josephs R. (of Maumee drainage), E. Fork of W. Br., Cambria Rd., Hillsdale Co.	C		A	C	C	R	C	D						D			D					C	R	C			A	A
2. St. Josephs R. (of Maumee drainage), W. Fork of W. Br., Territorial Rd., Hillsdale Co.	R		A	C		D	R	R	D				D			R						C	R				A	D
3. Bean Cr., 1-2 km below Dillon Hgwy., Lenewee Co.	R		C	R		R	D	R	D		R	R	R	R		C							C	A			R	
4. R. Raisin, Monroe St., Monroe, Monroe Co.		D				D			A			C		D			D		R			D	A				D	
5. R. Raisin, Telegraph Rd., Monroe, Monroe Co.		D	D	D					A	D?							D		D				A	D		D		D
6. R. Raisin, Raisinville Rd., Monroe Co.	D	D	D	D					A								D						C	D			D	D
7. R. Raisin, Doty Rd., Monroe Co.	D	D	D	D					C								D						C	D				
8. Macon Cr., Stowell Rd., Monroe Co.	D	D	D	D		D	D		D		D				D	D	D	D		D			D		D	D	D	D
9. Macon Cr., Dundee-Azalia Rd., Monroe Co.	D			C		D	D				D												A					
10. Macon Cr., N. Br., Day Rd., Monroe Co.									D		D																	
11. Macon Cr., Mid. Br., Wilcox Rd., Monroe Co.	C			D							D												A					
12. Macon Cr., Mid. Br., Petersburg Rd., Monroe Co.				D			C				C		C										A					
13. Macon Cr., S. Br., Wilcox Rd., Monroe Co.	A			C			C		D		D*												A					
14. Macon Cr., S. Br., Petersburg Rd., Monroe Co.	A			C			R		R		D*		C			D							A					
15. Wolf Cr., Tipton Hgwy., Adrian, Lenewee Co.							R				R												A					
16. Evans Cr., Maumee St., Tecumseh, Lenewee Co.																												
17. R. Raisin, Evans St., Tecumseh, Lenewee Co.								C	D														A	C				
18. R. Raisin, Staib Rd., Lenewee Co.			D	R				C	D				C			D						R	A	C			D	
19. R. Raisin, Austin Rd., Manchester, Washtenaw Co.		D	D	D			D	D					D			D							D	D			D	
20. R. Raisin, Sharon Valley Rd., downstream crossing, Washtenaw Co.		C	C	C		C	D						C			R						C	C	A			C	
21. R. Raisin, Sharon Valley Rd., upstream crossing, Washtenaw Co.		R	R	C		R			D				D										D*		C			D*	
22. Goose Cr., Cement City Hgwy., Lenewee Co.																												
23. Sandy Cr., Dixie Hgwy., Monroe Co.																												
24. Stony Cr., Telegraph Rd., Monroe Co.				D												D							C	D			D	
25. Huron R., Argo Dam to Gallup Park, Ann Arbor, Washtenaw Co.		R	D					D	R	D*			R			R			D					C			D	
26. Portage R., NE of Silver Lk., Washtenaw Co.			C					R	R				R			R					R	C	R	A			C	A

A = abundant, >5 specimens/man-hour; C = common, 1-5 specimens/man-hour; R = rare, <1 specimen/man-hour; D = only dead shells found; D* = presumed to be living at site, but no live specimens seen; ? = specimen lost.

[1]Locality numbers correspond to numbers on the map in Fig. 1.

1948 work; Station 26 with van der Schalie's (1938) 1932 results; others with UMMZ records between the years 1880 and 1930). Thus, it seems that these streams have retained their original faunas.

In contrast, the lower river faunas appear to have been greatly reduced, probably due to domestic and industrial wastes. For example, the lower Raisin (Stations 4-7), which now contains four species, once held 20 (UMMZ records). But, even here, mussel density of those four species is fairly high today, and so, in spite of past history, current conditions are favorable for mussels. I believe what has happened here (and this may apply elsewhere as well) is that the original fauna was destroyed by pollution, but the river was recolonized once conditions again became suitable. A balance between periodic local extinction or depletion and recolonization might then occur. Where such conditions exist, we might expect species composition to shift towards good colonizers; species possessing such traits as rapid growth, early maturity, numerous or mobile fish hosts, and tolerance to many substrata, as well as resistance to the specific factors causing mortality. It is interesting to note that, of the four species now in the lower Raisin, two (*Lampsilis radiata siliquoidea* and *Anodonta grandis*) have many reported fish hosts (Fuller, 1974), and available data (Coker et al., 1922) suggest that all four grow rapidly and mature quickly. If water quality remains good, they might be joined by slower colonizers, and an extensive fauna might develop, depending upon the frequency of bouts with pollution. Because mussels have long life histories and rather exacting habitat requirements (e.g., see van der Schalie, 1938), colonization may be slow (especially in drainages with barriers like dams, waterfalls, or lakes), and even rare episodes of pollution may be sufficient to greatly affect faunal composition.

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FRESHWATER MOLLUSK FAUNA OF THE KHUZESTAN AND KHORRAM-ABAD AREAS IN SOUTHWESTERN IRAN. – The Khuzestan and Khorram-abad areas are located in the tropical and subtropical regions of southwestern Iran. These areas have a good variety of aquatic snails and, compared to other parts of Iran, a high incidence of snail-borne trematode infections in man and other mammals. The snails recorded below were collected in various water bodies in the areas. After being relaxed in a menthol solution, the snails were preserved in 70% alcohol. The identifications of the snail species were based on shell characters, as well as on the morphology of internal organs. Preserved specimens were sent to the Danish Bilharziasis Laboratory (World Health Organization Snail Identification Centre) at Charlottenlund, Denmark, for confirmation of identifications. Voucher specimens have been deposited in the collections of the Danish Bilharziasis Laboratory.

The species of aquatic mollusks found in the Khuzestan area were *Bulinus truncatus* (Audouin), *Gyraulus intermixtus* (Mousson), *G. euphraticus* (Mousson), *Lymnaea (Radix) auricularia* Linnaeus (form *gedrosiana* Annandale & Prashad), *L. (Fossaria) truncatula* (Müller), *Physa acuta* Draparnaud, *Melanoides tuberculata* (Müller), *Melanopsis costata* (Férussac), *M. praerosa* (Linnaeus), *M. nodesa* (Férussac), *Viviparus bengalensis* (Lamarck), *Corbicula fluviatilis* (Müller), *Theodoxus euphraticus* (Mousson), *T. cinctellus* (Martens) and *Unio* sp.

The species of aquatic mollusks found in the Khorram-abad area were *Gyraulus convexiusculus* (Hutton), *Melanopsis buccinoides* (Mousson), *Theodoxus doriae* (Issel), *Bithynia rubens* (Martens), *Physa acuta*, *Lymnaea (Radix) auricularia*, *L. (Fossaria) truncatula* and *Pisidium nitidum* Jenyns.

In respect to snail-borne trematode infections in the area, Table 1 shows the intermediate and final hosts of some of these parasites.

TABLE 1. Mammalian trematode parasites and their intermediate and final hosts in the Khuzestan and Khorram-abad areas.

No.	Parasite	Intermediate host	Final host
1	*Schistosoma haematobium*	*Bulinus truncatus*	Man
2	*Schistosoma bovis*	*Bulinus truncatus*	Ruminants
3	*Ornithobilharzia turkestanicum*	*Lymnaea auricularia*	Ruminants
4	*Fasciola hepatica*	*Lymnaea truncatula*	Ruminants
5	*Fasciola gigantica*	*Lymnaea auricularia*	Ruminants
6	*Paramphistomum micyobothrium*	*Bulinus truncatus*	Ruminants
7	*Gymnocephalus* sp.	*Lymnaea auricularia* *Gyraulus* sp.	Unknown
8	*Heterophyes* sp.	Unknown	Man & carnivores
9	*Metagonimus* sp.	Unknown	Man & carnivores
10	*Opisthorchis* sp.	Unknown	Pig
11	*Alaria alariae*	Unknown	Carnivores
12	Bird schistosomes	Unknown	Aquatic birds

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