By comparing variations in the tritium content of precipitation with corresponding variations in the tritium content of runoff in the two basins, it was possible to determine the travel time of precipitation through the ground-water system to the stream, or the mean residence time of recharge in the two basins. The correlations are shown in Figs. 1 and 2, together with the values for the water budgets of precipitation, runoff, and ground-water recharge. The appearance in ground-water recharge of tritium from the bomb tests, as indicated by analyses of samples from one of the wells in the Wisconsin project, is shown in Fig. 1. The curve for tritium content of ground water is for water from well 7/8/7-272, which is located in the glaciofluvial fill of Black Earth Creek. It is 7 m deep and cased to about 5.5 m, and the depth to the water table is about 2.1 m. It may be noted in Fig. 1 that the value for ground water for 30 July was 34 tritium units. The 59-day lag indicated for the 4 April peak suggests a new and higher peak, of about 43 to 45 tritium units, for the ground water on 30 July, and other wells sampled in this basin show such an expected increase in tritium content. In laboratory analysis of samples having low concentrations of tritium, electrolytic enrichment is required, and this may result in errors of the same order of magnitude. The lower the tritium content of water, the greater the required enrichment and the greater the possibility of analytical error.

The mean residence time of ground-water recharge in the Wisconsin basin was about 45 days, and in the much smaller New Jersey basin, about 30 days.

The measurement for the total amount of tritium fallout in the two basins during the period March through July 1958 is in close agreement with measurements of solid debris in fallout from fission bombs. Although the levels of tritium activity were much lower in the New Jersey precipitation samples than in the Wisconsin samples, in the New Jersey samples the tritium was contained in much larger quantities of precipitation. The measurements of 13,100 T.U.-centimeters for the Wisconsin basin and 12,400 T.U.-centimeters for New Jersey differ by only about 6 percent. According to Alexander and others (*3*), a measurement for strontium-90 accumulated at the University of Wisconsin at Madison in October 1959 was 23.7 mc/km^2, and one for strontium-90 accumulated at Rutgers University in New Jersey in the same month was 24.4 mc/km^2. These measurements differed by only about 3 percent, and in both cases the variations were within the range of sampling and analytical error.

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Conchostracans: Living and Fossil from Chihuahua and Sonora, Mexico

Abstract. *In August 1963, living conchostracans (branchipod Crustacea) of the genera* Leptestheria *and* Eulimnadia *were collected at three stations in Chihuahua. One Sonoran locality yielded Triassic fossils of the family Cyzicidae, a widespread North American group. The geographic range of the geologically younger families Leptestheriidae and Limnadidae (particularly the genus* Eulimnadia*) thus extended to Chihuahua during post-Mesozoic time.*

Relatively little is known about living conchostracan populations in Mexico (*1*). A recent comprehensive review of Mexican crustaceans did not list any study on the subject (*2*). Mattox (*3*) merely cited species of *Leptestheria, Eulimnadia, Cyzicus,* and *Lynceus.* Fossil conchostracans have not been reported previously. This report is based on collections made by Shaffer while he was engaged in a palynological survey (*4*). The Chihuahua sites chosen at random cannot be said to be representative of the entire area. Several turbid roadside ponds were sampled but no conchostracans were found either in the Durango area, about 600 km south of Chihuahua, or on the Central Mexican Plateau.

Locality 1: State of Chihuahua; 90 km west of Chihuahua, Highway 16. Elevation, 2000 m; pond, 6 m longest dimension, 7.6 cm maximum depth; water clear; bottom rocky and gravelly; algal mats on bottom; tadpoles, beetles, and conchostracans. Collection made 16 August 1963. Conchostracans: *Eulimnadia antillarum* (Baird) (*5*), two specimens, both females bearing eggs; four growth lines on shell; ratio of width to length of shell, 0.57 to 0.71. *Leptestheria compleximanus* (Packard), 1 specimen, female, 18 growth lines on shell. *Eulimnadia* sp., 14 complete specimens, 5 empty valves; length of shell, 5.1 to 6.9 mm, width, 3.2 to 5.2 mm; 5 to 7 growth lines; 12 to 15 spines on telson; ratio of females to males, 13:1. This may be a new species (*3, 5–7*). Cultures from dried algal mats and sparse silty mud in constantly aerated water yielded three naupliids. Two naupliids developed into adult females with valves of glass-like transparency (*Eulimnadia* sp.) and succumbed after 2 months.

Locality 2: State of Chihuahua; 164 km west of Chihuahua, Highway 16. Roadside ditch extending intermittently for 100 to 200 meters; water turbid; depth, 0.3 m maximum; clay and silt-mud bottom; tadpoles, beetles, anostracans, and conchostracans. Collection made 16 August 1963. Conchostracans: *Leptestheria compleximanus* (Packard), seven specimens, ratio of females to males, 6:1. One specimen, a female, shows shell repair. The last five growth lines are curved upward in echelon fashion across the injured site, with a niche on ventral margin indicating shell repair was incomplete at the time of collection (*8*).

Locality 3: State of Chihuahua, Laguna Bustillos; 90 km north-northwest of locality 1. Puddles on mudflat margining laguna on the east side; depth, 5 to 10 cm. One puddle, a dry depression bearing empty conchostracan valves, another puddle with living conchostracans all belonging to *Leptestheria compleximanus* (Packard); 80 complete individuals, a few showing shell repair. Ratio of females to males, 4:1; length, 3 to 5 mm, width, 1 to 3 mm; growth lines variable from 5 to 10. Characteristic spine at anterodorsal extremity of rostrum occasionally oblique or perpendicular to rostrum. Numerous other puddles and water-filled hoofprints on the flat were teeming with conchostracans. Cultures from dried muds have yielded an actively breeding population (*L. compleximanus*). Some individuals have survived almost 3 months in constantly turbid water to which no nutrient has been added.

Locality 4: State of Sonora, Santa Clara; 5 km west of Tonichi, 130 miles west of locality 2 (for map and measured section, see *9*; sample from coal mine diggings along steep hillside). No water-filled ponds occurred in the Triassic outcrop area. There was no evidence of empty conchostracan valves in mudcracks of the few dry ponds encountered.

Black, silty, micaceous shales bore impressions of valves assignable to *Cyzicus* (*Lioestheria*) sp. Prominent hachure-like markings ornament growth bands; number of growth lines, 15; valve length, 2.25 to 2.40 mm; width, 1.65 to 2.10 mm. Three complete right and left valves and dozens of valve fragments, all with characteristic ornamentation.

Plant and molluscan fossils from this locality have recently been described [see bed A-33 (*9*)]. Conchostracans were not reported. Fragments of plant debris and a probable pelecypod (*Monotis*) occur on the black shale bearing fossil conchostracans. A brackish water environment is indicated.

A few comparisons can show the significance of the new data. Fossil flora at Santa Clara suggest an age equivalent to that of the Newark Group (Carnian) of Virginia (*9*, pt. 3, p. 7). *Lioestheria inornata* Raymond [=*Cyzicus* (*Lioestheria*)] is known from the Virginia beds (*10*). Other *Lioestheria* species have been found in equivalent beds in Pennsylvania and New Jersey (*11*), the Maritime Provinces of Canada (*12*), and the Shinarump formation of southern Utah (*13*). Thus, lioestheriid distribution in Carnian time ranged from Canada to Mexico and was parallel to the widespread North American distribution of living *Cyzicus*.

Since *Lioestheria* is found in the upper Navajo sandstone (Lower Jurassic) exposed near Shonto, Arizona (*14, 15*), there is indication of lioestheriid persistence beyond Carnian time at least in the Arizona-Mexico area. In this regard, the absence of living Cyzicidae from collections at the Chihuahua sites is of interest. Today *Cyzicus* occurs in all of our states bordering Mexico. As noted, fossil *Cyzicus* occurs to the west of Chihuahua. Farther west, in Lower California, *Eocyzicus digueti* (Richard) is known (*3, 16*). In Baja, California, Shaffer explored several large, dry, flat lake basins exceeding 8 km in diameter but no conchostracan valves were found. One certain locality for *Cyzicus mexicanus* (Claus) is Zimapan, State of Hidalgo (southeast of the Chihuahua collecting sites) (*7*).

The known species of *Leptestheria* and *Eulimnadia* are all Recent. The absence of a Mesozoic record of these genera (*17, 18*) therefore, indicates that the only form in the Upper Triassic pond sites in Chihuahua was *Cyzicus*. The occurrence of both *Leptestheria compleximanus* and *Cyzicus mexicanus* in a single Kansas pond or pool (*7*, p. 306) and the known distribution of *Leptestheria* and *Eulimnadia* in Texas today mean that these genera which have come into existence in late Mesozoic-Tertiary time have become widely dispersed in the Southwest.

Note added in proof. Eulimnadia geayi Daday 1926 and *Leptestheria vanhoffeni* Dad. 1923 are known from the State of Coahuila, which borders Chihuahua on the east.

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Inhibition of Synthesis of the Cell Wall of Staphylococcus aureus by Cephalothin

Abstract. *Cephalothin, 7-(thiophene-2-acetamido)-cephalosporanic acid, suppresses synthesis of the cell of* Staphylococcus aureus. *Exposure to this agent led to a reduction in the degree of incorporation of carbon-14-lysine into the mucopeptide of the cell wall material and to an accumulation of* N-acetyl glucosa*mine in the cell. The intensity of the lesions was comparable to that produced by penicillin.*

Studies in this laboratory have indicated that organisms exposed to cephalothin, 7-(thiophene-2-acetamido)-cephalosporanic acid, a derivative of cephalosporin C, undergo a series of morphologic changes which resemble closely those produced by penicillin and which were thought to result from a defective formation of the cell wall. Since cephalosporin C and penicillin are chemically related and both induce the same type of morphologic alterations (*1*), the mechanism of action of these antibiotics might be similar. This report presents evidence that this is indeed the case and that exposure to both cephalothin and penicillin leads to the accumulation of *N*-acetyl glucosamine in the cell, and to the reduction of mucopeptide synthesis in the bacterial wall.

Staphylococcus aureus SH (*2*) was inoculated into a medium consisting of yeast extract, peptone, and glucose. The inoculated medium was incubated at 37°C, with constant shaking, until the optical density of the culture reached 1.5 at 582 mμ. The culture was washed once with 0.03*M* phosphate buffer (*p*H 6.8), and the cells were suspended in

Table 1. The effect of cephalothin and penicillin on the incorporation of C^{14}-lysine into the cell wall or into cell protein. The signs in parentheses indicate: (+), no inhibition; (−), inhibition.

Time of exposure (min)	Specific activity (count/min per mg)		
	Control	Cephalothin	Penicillin
		Mucopeptide	
5	6,605	766 (−)	1176 (−)
10	13,327	1230 (−)	1496 (−)
		Protein	
5	2,808	2854 (+)	2750 (−)
10	4,868	5227 (+)	4515 (−)