And provide the essential illumination, aeration, and temperature, for a healthy growth, and add broken pieces of concrete for them to grow on. The Algae is fed to the Nymphs by transferring the Algae covered stones or added broken pieces of concrete to the Nymphs culture.

Only the Nymphs are used as fish food and they are best collected with a roast baster or large asepto syringe and strained through a tea strainer. We are depending mostly on the Nymphs to maintain the continuance of the population, and we must make sure that enough of them remain in the culture at all times. When the minimum time, and exact temperature required for the completion of each life cycles is known, it may be possible to force them to produce several generations per year, which would make their culture more profitable.

There is another known herbivorous specie Peltoperla arcuata which possibly may be better qualified for artificial propagation, and worth investigating. It is recognized by its wider flatish thorax and wider and shorter legs, and its shorter abdomen with only seven showing segments, and its shorter terminal cerci. They are supposed to be common in Eastern and Western areas near the Southern Canadian border.

Maximal Egg Number in
Pimephales Notatus Nests
Donald G. Buth¹ and Charles R. Peterson²

¹Department of Ecology, Ethology and Evolution
University of Illinois, Urbana, Illinois 61801

²Department of Zoology, Washington State University
Pullman, Washington 99163

INTRODUCTION

Numerous studies involving spawning sites of bluntnose minnows, Pimephales notatus, have reported various aspects of reproductive behavior as well as environmental parameters associated with spawning (Carlander, 1969). The only available data concerning the number of eggs per spawning site were reported by Hubbs and Cooper (1936) who calculated an average of 2477 eggs per spawning site based on observations of 39 nests from three localities in Michigan. The actual numbers of eggs for each of the 39 nests observed were not presented in their study, nor was the range of numbers of eggs per spawning site reported. Hubbs and Cooper (1936) did, however, hint at a possible upper limit to the number of eggs per spawning site reporting that in a single nest more than 5000 eggs were laid within 48 hours.

Hankinson (1919) also noted the occurance of certain large P. notatus nests. He reported: “The eggs are usually placed very closely together in a roughly circular or oblong patch with the longest diameter typically 4 or 5 inches; the largest observed was 10 by 4 inches. Possibly this was formed by the joining of two patches, since two or more fish frequently use the same stone.”

Maximal Egg Number in Pimephales Notatus Nests
Donald G. Buth¹ and Charles R. Peterson²

¹Department of Ecology, Ethology and Evolution
University of Illinois, Urbana, Illinois 61801

²Department of Zoology, Washington State University
Pullman, Washington 99163

INTRODUCTION

Numerous studies involving spawning sites of bluntnose minnows, Pimephales notatus, have reported various aspects of reproductive behavior as well as environmental parameters associated with spawning (Carlander, 1969). The only available data concerning the number of eggs per spawning site were reported by Hubbs and Cooper (1936) who calculated an average of 2477 eggs per spawning site based on observations of 39 nests from three localities in Michigan. The actual numbers of eggs for each of the 39 nests observed were not presented in their study, nor was the range of numbers of eggs per spawning site reported. Hubbs and Cooper (1936) did, however, hint at a possible upper limit to the number of eggs per spawning site reporting that in a single nest more than 5000 eggs were laid within 48 hours.

Hankinson (1919) also noted the occurance of certain large P. notatus nests. He reported: “The eggs are usually placed very closely together in a roughly circular or oblong patch with the longest diameter typically 4 or 5 inches; the largest observed was 10 by 4 inches. Possibly this was formed by the joining of two patches, since two or more fish frequently use the same stone.”

Maximal Egg Number in Pimephales Notatus Nests
Donald G. Buth¹ and Charles R. Peterson²

¹Department of Ecology, Ethology and Evolution
University of Illinois, Urbana, Illinois 61801

²Department of Zoology, Washington State University
Pullman, Washington 99163

INTRODUCTION

Numerous studies involving spawning sites of bluntnose minnows, Pimephales notatus, have reported various aspects of reproductive behavior as well as environmental parameters associated with spawning (Carlander, 1969). The only available data concerning the number of eggs per spawning site were reported by Hubbs and Cooper (1936) who calculated an average of 2477 eggs per spawning site based on observations of 39 nests from three localities in Michigan. The actual numbers of eggs for each of the 39 nests observed were not presented in their study, nor was the range of numbers of eggs per spawning site reported. Hubbs and Cooper (1936) did, however, hint at a possible upper limit to the number of eggs per spawning site reporting that in a single nest more than 5000 eggs were laid within 48 hours.

Hankinson (1919) also noted the occurance of certain large P. notatus nests. He reported: “The eggs are usually placed very closely together in a roughly circular or oblong patch with the longest diameter typically 4 or 5 inches; the largest observed was 10 by 4 inches. Possibly this was formed by the joining of two patches, since two or more fish frequently use the same stone.”
**RESULTS AND DISCUSSION**

On 19 May 1973, three *P. notatus* nests were observed in a tributary of the Embarras River, 7.2 km west of Rose Hill, Illinois (Jasper Co., T8N, R9E, Section 28). The tributary was clear and very slow moving with a sand and shale bottom. Spawning sites were located in a single pool, approximately 13 m long, 1.2 m wide, with a maximum mid-stream depth of 15 cm. Eggs were observed coating the undersurfaces of three flat pieces of shale in the middle of the pool. Nests were photographed (Fig. 1) to facilitate counting the eggs. The three spawning sites yielded counts of 5298, 5821, and 6323 eggs, respectively, for an average of 5814 eggs. Each observed nest contained a single layer of eggs which appeared to be in a variety of developmental stages. Each nest was guarded by an individual tuberculate male *P. notatus*. These three males appeared to be the only fish in the pool and we assumed that each nest was the work of the single male associated with it. Placement of eggs on the undersides of objects precludes the possibility of other cyprinid species contributing eggs to the *P. notatus* nests, as is often the case with many egg-scattering species.

The nests we observed contained exceptionally large numbers of eggs with the count of 6323 eggs being the largest ever reported from a single spawning site. The presence of eggs in various developmental stages is indicative of spawning over a period of time, presumably with several females. Cooper (1935) reported that a single female lays from 200 to 500 eggs at one time. Thus, the number of females contributing to each 16
of these exceptionally large nests can only be roughly estimated, with possibly as many as several dozen females contributing to a given nest.

Literature cited:


Jellyfish of the Sierra Foothills

By Mary Bacon
Outdoor California
Mar.-April, 1977

Jellyfish are ocean creatures. Everyone knows that. Jellyfish are those strange-looking, colorless blobs which float passively about the seas, tossed and thrown at the will of the waves. They range from minuscule dabs to sizeable multi-tenacled "things" capable of inflicting painful stings. They are found only in the ocean. Right?

Wrong. Swimmers at a small private lake in El Dorado County in the Sierra foothills, over one hundred miles from the ocean, discovered this last summer, much to their annoyance. The numerous tiny creatures found floating on the lake were identified by the author and Dr. Charles Moser, professor of zoology at California State University, Sacramento, as a species of rare freshwater jellyfish, scientific name Craspedacusta sowerbii.

Where is it found? Craspedacusta sowerbii, the only known American species of freshwater jellyfish, appears to have been introduced into North America from South America or the West Indies. Its distribution in North America is not fully known. First found in the United States in 1908, it has been noted in at least 50 localities, mostly in states east of the Mississippi River and in a few scattered locations in the West. Freshwater jellyfish are found in small lakes and ponds and abandoned quarries, especially between July and October.

What does it look like? The diameter of the Jellyfish's bell ranges from 5 to 22 millimeters—that's from one-fifth to seven-eights of an inch.