

# Kansas Pearly Mussel Newslines

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## Winged Mapleleaf Confirmed in Missouri & Arkansas

Chris Barnhart, Southwest Missouri State University

The *Kansas Pearly Mussel Newslines* is published on an occasionally basis and includes topics about freshwater mussels and other aquatic critters.

Karen J. Couch, Editor & Illustrator  
Brian Obermeyer, Associate Editor

The winged mapleleaf, *Quadrula fragosa*, was formerly widespread in the middle and upper Mississippi drainage

as well as the upper Arkansas River system in Kansas. The species declined early in the 20<sup>th</sup> century and was apparently not collected for some 50 years, until a population was rediscovered in the St. Croix River in 1985. This discovery by Marian Havlik led to the winged mapleleaf being placed on the federal Endangered Species list in 1991. The St. Croix population was thought to be the only one living. However, in 1996, mussels that appeared similar to winged mapleleaf were collected in the Ouachita River in Arkansas by Bill Posey and John Harris. In 2001, a morphologically similar specimen was found in the Bourbeuse River in Missouri by Andy Roberts and me, and a second specimen was collected at the same site the following year.

These specimens remained problematic until recently, when Dr. Jeanne Serb compared mitochondrial DNA from tissues of all three populations as well as from several other related species in the genus *Quadrula*. Jeanne confirmed that the winged mapleleaf is a genetically distinct species and that the St. Croix, Ouachita, and Bourbeuse specimens are all the “genuine article”. Genetic confirmation is especially satisfying for this species, because the shell morphology of its closest relative, the common mapleleaf *Quadrula quadrula*, is extremely variable and often approaches the shape of the winged mapleleaf rather closely.

Host fish studies on the St. Croix population last summer found that the blue catfish and channel catfish are suitable hosts for winged mapleleaf, and releases of propagated juveniles took place and will be continued this year. Attempts to obtain gravid females of the Ouachita population were not successful. This summer, we anticipate survey work to locate more specimens in the Bourbeuse and Ouachita and to determine the brooding period.

Winged mapleleaf was formerly found in at least eleven states. The historical occurrence of this species in Kansas is evidenced by shell material collected in 1982 by Charles H. Cope from the Neosho and Verdigris rivers. It is not impos-

sible that the species may still occur in Kansas or elsewhere, hidden among the relatively abundant and variable common mapleleaf.

## Quantitative Unionid Mussel Survey Results: Marais des Cygnes National Wildlife Refuge

Edwin J. Miller, KDWP, Independence, KS

On August 20 and 21, 2002, a quantitative survey for unionid mussels was conducted on two sites of the Marais des Cygnes River within the boundaries of the Marais des Cygnes National Refuge. This survey was a follow-up of recent qualitative surveys including the Kansas Pearly Mussel Workshop field trip that rediscovered the black sandshell (*Ligumia recta*) in the river in July 2002.

Quantitative assessment of mussel beds was chosen as method to estimate mussel density and total mussels at a site. This data is useful in monitoring changes in density due to pollution events, drought, or illegal harvest.

### Methods

Two sites were chosen that were previously identified as high density sites by earlier qualitative sampling. The length of the shoal was measured and 10 percent of the possible transects were randomly selected. The transects were sampled using meter-square quadrats. Transects started from the shoreline where mussels were first encountered and continued to a depth of one meter.

### Results

Site MdC02A location and results are shown on Table 1. There were 96 quadrats sampled at this site. The average number of quadrats per transect was 4.8. Fifteen species were recorded. There were 1070 specimens of which 73.8% were threeridge (*Amblema plicata*). The number of unionids per quadrat was 11.12 (sd = 2.96; Range 1 – 36).

One black sandshell (*Ligumia recta*) was recorded in the transects at Site MdC 02A. It was determined by measurements that it was the same specimen found during the Kansas Pearly Mussel field trip in July, 2002.

Site MdC02B results are shown in Table 2. There were 23 quadrats sampled at this site. The average number of quadrats per transect was 4.6. The mean number of un-

ionids per quadrat was 24.2 (sd = 4.05: Range 3 – 65). Threeridge and washboard (*Megaloniaias nervosa*) combined made up 74.3% of the unionids.

Other notable species found at MdC02B were 14 butterfly (*Ellipsaria lineolata*), 1 purple pimpleback (*Cycloniaias*

*tuberculata*), and 1 mucket (*Actinoniaias ligamentina*).

Note: A full report from this sampling effort can be obtained by contacting E. J. Miller at edm@wp.state.ks.us or calling 620-331-6820.

**Table 1.** Summary statistics, location, and unionid species abundance list from Site MdC02A located on Marais des Cygnes River within Marais des Cygnes NWR.

<b>RIVER :</b> Marais des Cygnes (USFWS National Refuge)			
<b>GPS</b> N38.22919° W94.64464° (upper end); N38.22795 W94.64532 (lower end)			
<b>DATE</b> 08-20/21-02		<b>LEGAL:</b> T 21S R25E S15 Co Linn	
<b>SURVEYED BY:</b> W. Busby, J. Goeckler, B. Loveless, E. Miller, T. Mosher, D. Mulhern, S. Roth			
<b>COMMENTS:</b> Total mussels = 1070. Gravel bar on right bank.			
<b>FLOW RATE:</b> 110-120cfs <b>WATER CONDITIONS:</b> slightly below normal, turbid			
# Quadrats m <sup>2</sup> : 96 Mean unionids per quadrat: 11.15 (sd = 8.78)			
Notes: <i>Amblema</i> /quadrat = 8.23 (sd = 7.71). Measured and weighed 100 <i>Amblema</i> : Mean wt. = 511 gms. Range: 160-760. Mean ht. = 85.4 (sd = 11.1) Ht. range: 60-96 mm. Three of 100 <i>Amblema</i> under legal-harvest size.			
	#	%	Common Name
<i>Amblema plicata</i>	790	73.8	Threeridge
<i>Ellipsaria lineolata</i>	20	1.9	Butterfly
<i>Elliptio dilatata</i>	4	0.4	Spike
<i>Fusconaia flava</i>	25	2.3	Wabash pigtoe
<i>Lasmigona complanata</i>	1	0.1	White heelsplitter
<i>Leptodea fragilis</i>	4	0.4	Fragile papershell
<i>Ligumia recta</i>	1	0.1	
<i>Megaloniaias nervosa</i>	46	4.3	Washboard
<i>Obliquaria reflexa</i>	40	3.7	Threehorn wartyback
<i>Pleurobema coccineum</i>	3	0.3	Round pigtoe
<i>Potamilus alatus</i>	4	0.4	Pink heelsplitter
<i>Potamilus purpuratus</i>	1	0.1	Bluefer
<i>Quadrula pustulosa</i>	121	11.3	Pimpleback
<i>Quadrula quadrula</i>	6	0.6	Mapleleaf
<i>Tritogonia verrucosa</i>	4	0.4	Pistolgrip

**Table 2.** Summary statistics, location, and unionid species abundance list from Site MdC02B located on Marais des Cygnes River within Marais des Cygnes NWR.

<b>RIVER :</b> Marais des Cygnes (USFWS National Refuge) Site MdC02B			
<b>GPS</b> N38.22368° W94.62962° (upper); N38.22382 W94.62913 (lower)			
<b>DATE:</b> 08-21-02		<b>LEGAL:</b> NE4 Sec. 14 T 21S R25E Co Linn	
<b>SURVEYED BY:</b> W. Busby, J. Goeckler, B. Loveless, E. Miller, T. Mosher, D. Mulhern, S. Roth.			
<b>COMMENTS:</b> Total mussels = 556. Gravel bar on right bank, bedrock low on left bank.			
<b>FLOW RATE:</b> 110-120cfs <b>WATER CONDITIONS:</b> slightly below normal, turbid			
# Quadrats m <sup>2</sup> : 23 Mean unionids/quadrat: 24.2/m <sup>2</sup> (sd = 16.43)			
Notes: <i>Amblema</i> /quadrat = 12.9/ m <sup>2</sup> (sd = 11.06)			
	#	%	Common Name
<i>Actinoniaias ligamentina</i>	1	0.2	Mucket
<i>Amblema plicata</i>	297	53.4	Threeridge
<i>Cycloniaias tuberculata</i>	1	0.2	Purple Pimpleback
<i>Ellipsaria lineolata</i>	14	2.5	Butterfly
<i>Elliptio dilatata</i>	12	2.2	Spike
<i>Fusconaia flava</i>	14	2.5	Wabash pigtoe
<i>Lasmigona complanata</i>	2	0.4	White heelsplitter
<i>Leptodea fragilis</i>	7	1.3	Fragile papershell
<i>Megaloniaias nervosa</i>	116	20.9	Washboard
<i>Obliquaria reflexa</i>	9	1.6	Threehorn wartyback
<i>Pleurobema coccineum</i>	5	0.8	Round pigtoe
<i>Potamilus alatus</i>	1	0.2	Pink heelsplitter
<i>Quadrula nodulata</i>	3	0.5	Wartyback
<i>Quadrula pustulosa</i>	69	12.4	Pimpleback
<i>Quadrula quadrula</i>	2	0.4	Mapleleaf
<i>Tritogonia verrucosa</i>	2	0.4	Pistolgrip
<i>Truncilla truncata</i>	1	0.1	Deertoe
<b>TOTAL</b>	<b>556</b>		

## Field Trip Results: Spring River near Lawton, Cherokee County, Kansas

by Edwin J. Miller, KDWP, Independence, Kansas

Twenty-eight participants enjoyed a morning foray to the Spring River on July 24, 2003 to culminate the Kansas Pearly Mussel Workshop held at Pittsburg State University. Everyone enjoyed the site and saw interesting and rare unionids and fish. Thanks to Bob Angelo for keeping field notes on the mussels that were documented at the site.

### Mussel species represented by live individuals:

1. Flutedshell – common (two juveniles found)
2. Ouachita kidneyshell – common
3. Neosho mucket - abundant
4. Wabash pigtoe – abundant
5. round pigtoe – present
6. pistolgrip – common
7. plain pocketbook – present
8. western fanshell – present
9. rabbitsfoot – present (totals: 12 live; 1 fresh valve)
10. ellipse – present
11. pimpleback – abundant
12. threeridge – present
13. creeper – common
14. fragile papershell – present
15. monkeyface – present
16. spike – common
17. mapleleaf – present
18. Asian clam – abundant

### Mussel species represented by shell material only:

1. bleufer (one articulated recent specimen)
2. elktoe (one articulated recent specimen)
3. white heelsplitter (one weathered valve)

A crew also seined fish and their biodiversity is as impressive as the mussels. The **fish species** seined or sighted included:

1. cardinal shiner
2. spotfin shiner
3. bluntface shiner
4. bigeye shiner
5. mimic shiner
6. red shiner
7. emerald shiner
8. rosyface shiner
9. slim minnow
10. suckermouth minnow
11. bluntnose minnow

12. gravel chub
13. blackstripe topminnow
14. brook silversides
15. longear sunfish
16. green sunfish
17. channel catfish
18. flathead catfish
19. slender madtom
20. fantail darter
21. orangethroat darter
22. slenderhead darter
23. banded darter
24. channel darter
25. spotted gar
26. mosquitofish

## 2004 Pearly Mussel Workshop

The 12<sup>th</sup> Kansas Mussel Workshop has been set for July 28 and 29, 2004. Wednesday, the first day of the workshop, will be held in the Lecture Hall in Beech Hall on the campus of Southwestern College, Winfield, Kansas and will include presentations about mussels and other aquatic topics. On Thursday, weather and water levels permitting, we plan to sample mussels at Grouse Creek. If you have a presentation you would like to share at the meeting, please contact Ed Miller by June 30, 2004. A meeting agenda will be sent out shortly thereafter to those persons on the Kansas Pearly Mussel Newsline mailing list. Mark your calendars, and we hope you all can make it!

Sampling results from last year's workshop field trip to Spring River are contained in this KPMN.

## Mussel Article in Wildlife and Parks Magazine

Within the pages of the March/April 2004 issue of "Kansas Wildlife and Parks" magazine is a very nicely written article by Bryan Simmons entitled, "Mussel Treasure". It explains the importance of having healthy mussel populations in our rivers and streams and many other interesting details as to why mussels are so fascinating. Some of Chris Barnhart's wonderful photographs are also included. Well done!

## Comparing Host Fish Requirements for Geographically Isolated Populations of Western Fanshell

Chris Barnhart and Nathan Eckert, Southwest Missouri State University

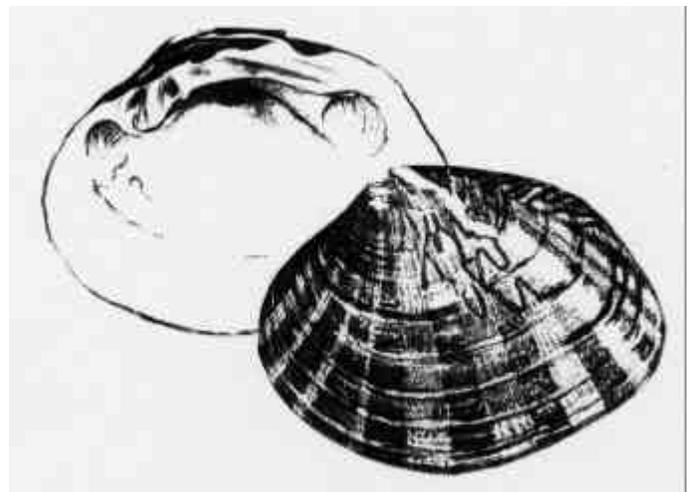
One of the most challenging aspects of mussel conservation is the poor state of our knowledge regarding their diversity. The western fanshell, *Cyprogenia aberti*, is a case in point. Traditional taxonomic classification indicates that there are two species of fanshell- *Cyprogenia stegaria* east of the Mississippi River, and *Cyprogenia aberti*, the western fanshell, in several widely scattered populations west of the Mississippi. However, recent study by Dr. Jeanne Serb recently revealed substantial genetic differences among populations of *Cyprogenia* in the Verdigris and Spring rivers in Kansas and the Black, St. Francis, and Ouachita rivers in eastern Missouri and Arkansas. We are now comparing the reproductive physiology and morphology of these populations to test the hypothesis that they are actually several distinct species.

Mussels are completely dependent on their host fish to support the metamorphosis of the glochidia larvae. Therefore, we are testing whether mussels from each population can transform effectively on the host fish found at other sites. So far, we have compared fanshell from five sites, and in each case we have found differences in their ability to transform on host fish. For example, glochidia from the

Verdigris River in eastern Kansas transformed readily on slenderhead darters from the verdigris, but fanshell from rivers in Missouri and Arkansas did not. For each mussel population, we have found at least one species of darter that works well with local mussels but not with fanshell from other sites. Interestingly, the logperch, *Percina caprodes*, appears to be a good host regardless of the source population.

Knowing which mussel populations are truly equivalent to one another is absolutely important. The western fanshell is fairly abundant in the Black and St. Francis rivers, and therefore has not been placed on the federal Endangered Species list. However, we now know that the fanshells in those rivers are not the same as those in the Verdigris. If the fanshells in the Verdigris were allowed to become extinct, it would not be possible to replace them with fanshells from Missouri or Arkansas, because those mussels are not genetically suited to the host fish that live in the Verdigris.

Conservation is partly about triage, determining which “patients” should be helped with the limited resources available. The taxonomic classification of many species is inaccurate and this can potentially lead to the loss of unrecognized species. The process for describing new species is much more complicated now than it was over a hundred years ago, when mussel species were designated based only on differences in the shapes of their shells. It will be many decades before the small number of scientists studying difficult groups can define them accurately. In the meanwhile, it would be wise to protect mussels in as many river systems as possible- they may well turn out to be new species!



Western fanshell, *Cyprogenia aberti* (Conrad, 1850) from the Spring River, Cherokee County, Kansas. Illustration from the book, “An Illustrated Guide to the Unionid Mussels of Kansas”, copyright 1997.

## FHSU Department of Biological Sciences to Conduct Surveys on Three Rivers in Southeastern Kansas

Curtis Wolf, Graduate Student, Department of Biological Sciences, Fort Hays State University

Students from the Department of Biological Sciences at Fort Hays State University will be spending time in eastern Kansas this summer. They will be searching for mussels in three rivers to begin a long-term inventory of the mussels in high-priority streams of Kansas. Funded by federal grant monies through the Kansas Department of Wildlife and Parks, a crew of six students will be surveying the mussels of the Marais des Cygnes and Fall rivers and Grouse Creek, all in eastern Kansas.

Surveys on the Marais des Cygnes River between Melvern Lake and the Marais des Cygnes National Wildlife Refuge near the Missouri state line actually began during the end of Summer 2003. Four sites were surveyed with quadrats. In these samples, more than 1,000 mussels of 16 species were collected. (Six mussels/m<sup>2</sup>), Threeridge mussels (*Amblema plicata*) comprised more than 25% of the mussels sampled. Other interesting species observed include two Kansas T&E listed species: mucket (*Actinonaias ligamentina*) (E), and butterfly (*Ellipsaria lineolata*) (T), and seven Species in Need of Conservation. Four more sites on the Marais des Cygnes River will be included during the Summer 2004 field season.

Eight sites will be surveyed on both the Fall River below Fall River Lake and on Grouse Creek in Butler and Cowley counties. Landowners on Grouse Creek have been very open to the mussel surveys and appear eager to learn more about the organisms in this basin. Data from this and other surveys will be used to assess the impact of a proposed reservoir to be placed in the southern portion of this stream. Fall River has an extensive sampling history, and our data will add to this growing data set.

Additionally, valves will be collected for a second study of recruitment of mussels in several streams. Several studies have observed senescent populations in which recruitment is stochastic. We believe that one factor associated with successful recruitment may be stream flow during the active breeding season for mussels. Depending on the timing of high flow events during and immediately before the breeding season, recruitment of the population may be greatly influenced. Through thin-sectioning of valves, we will determine the age structure of several populations of mussels. From the age data, we hope to correlate the flow during the year of recruitment to strong year classes. Ultimately, we hope to make management recommendations with regard to minimum or maximum flow during the breeding season in an effort to conserve healthy, recovering, and imperiled mussel communities.

## A Note from the Editor

A call for submissions for the next issue of the Kansas Pearly Mussel Newsline is being made now. Apologies to all those who may have had something in mind for this issue; time did not allow me to contact everyone.

So, start putting those ideas on paper now! I will be seriously trying to put out another information-packed issue in about six months. Your summer's aquatic activities will be of interest to all. You can send email to:

kcoach.mussels@juno.com

Thanks in advance!

## Mussel News from the Past: How Uniones Emigrate

From the NAUTILUS (Vol. 12, No. 12, April, 1899)

by Lorraine S. Frierson

In the June number of NAUTILUS, 1891, is an article by Mr. C.T. Simpson on "The Means of Distribution of Unionidae in Southeastern United States", in which he says that he had often found *U. obesus* Lea in dry places, where for nine months of the year they must have been in a dormant condition.

This Unio, which is no doubt a variety of *U. declivis*, *U. symmetricus*, etc., is one that can stand such changes. I have obtained them in places where they must have spent half of their lives in such a dormant condition. On the other hand, some Anodontas and *Margaritana confragosa* Say are so intolerant of heat that they are frequently killed by the sun's rays while yet in water six inches deep. For the spread of these species of Unionidae some other means than those which would suffice for *U. obesus* must be employed. Should it be shown that embryonic unios become encysted in fish, of course the problem would be solved in large part. There is, however, a method employed in nature which I have not seen mentioned, and which is to my mind a complete solution to the problem. Did any of my fellow Unio "cranks" ever catch Unio during the winter months by means of a long slender switch? You go to a bed of mussels in clear water, and standing on the shore you gently poke the end of your switch into the gaping shell of the unsuspecting unio. As soon as it feels the stick it closes the shell tightly on it; then you gently pull the mussel out and put it in your game bag.

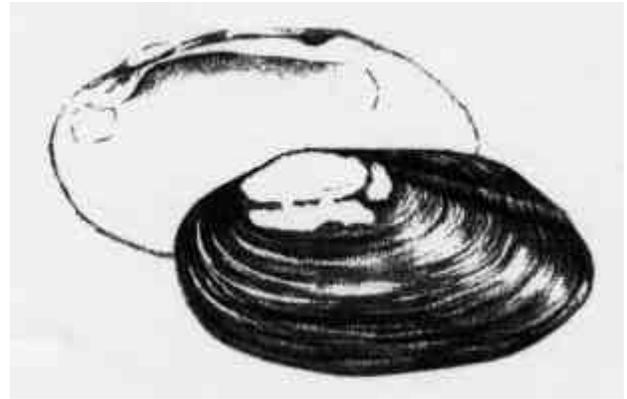
Now suppose that this mollusk was an impregnated female, and that instead of a switch it was a wild duck's toe, which was accidentally caught between the valves. What would happen? Why, that the duck would fly out of the Black Warrior River in Alabama, and finally alight in lake Kissimee, Florida, and by this time either the unio would let go or the duck's toe be cut off; and presto, a whole colony of unios is established. This is no

fancy, but an observed fact, that is, so far as the transportation of unios is concerned.

Twice I have killed wild ducks with unios attached to their toes, and have seen what I believed to be unios hanging from the feet of others flying overhead. What has come under my individual observation twice must have happened thousands of times. How else could Unionidae from the Mississippi drainage get into Florida?

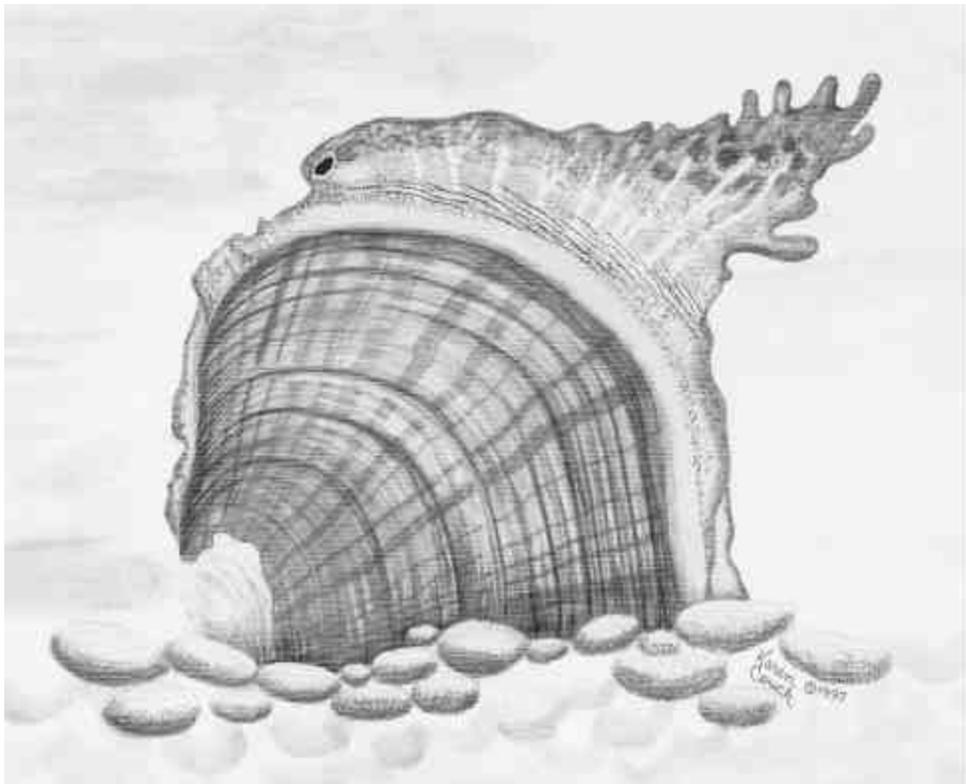
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*Editor's Note:* The exact identity of *Unio obesus* is not clear, but it is most likely the species *Uniomerus tetralasmus* (Say 1831) (commonly known as the pondhorn), due to the fact that Frierson mentions its relationship to *Unio* (or, *Uniomerus*) *declivis* and of its ability to estivate during drought. Incidentally, the pondmussel, *Ligumia subrostrata* (Say 1831), is also able to estivate. The mussel species *Margaritana confragosa* mentioned in the article is the rock pocketbook, *Arcidens confragosus* (Say 1829).



Pondhorn mussel, *Uniomerus tetralasmus*, from "An Illustrated Guide to the Unionid Mussels of Kansas", copyright 1997.

Female plain pocketbook, *Lampsilis cardium*, from "An Illustrated Guide to the Unionid Mussels of Kansas", copyright 1997.



**Kansas Pearly Mussel Newsline**

C/O Karen J. Couch  
49 Sierra Circle  
Olathe, KS 66061

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