

# DELTA TALK

OFFICIAL PUBLICATION OF P.V.A.S.

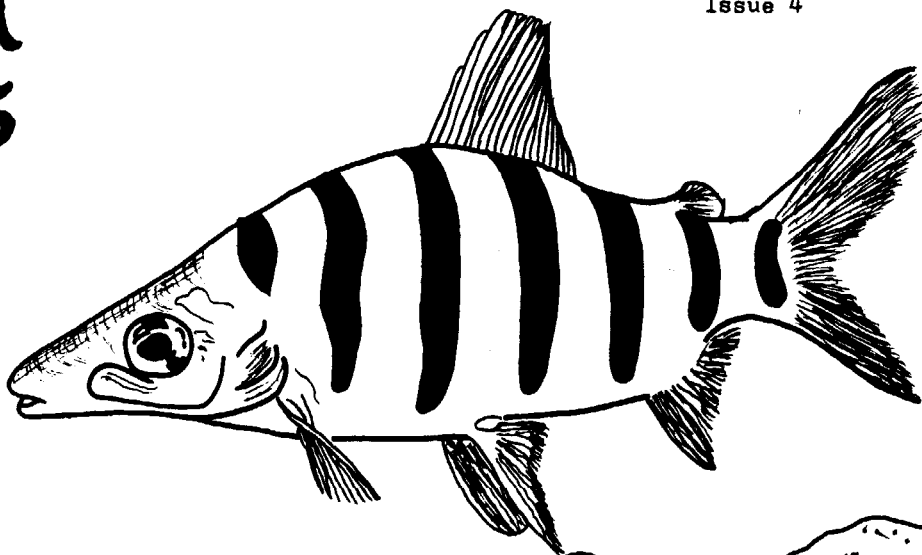
APRIL 1977

50¢ per copy

Volume 8

Issue 4

PROBS



DELTA TALE is published for the benefit of the Potomac Valley Aquarium Society (formerly the Potomac Valley Guppy Club), a non-profit organization, established in 1960 for the purpose of furthering the aquarium hobby by disseminating information, encouraging friendly competition, soliciting participation in its show, and promoting good fellowship. Correspondence should be addressed to Secretary, P.V.A.S., P.O. Box 6219, Shirlington Station, Arlington, Virginia, 22206. Original articles and drawings may be reprinted if credit is given the author and DELTA TALE. Two copies of the publication in which the reprint appears should be sent to DELTA TALE which will forward one copy to the author. All materials for inclusion in the DELTA TALE must reach the editor no later than the Saturday after the monthly Monday meeting.

The Potomac Valley Aquarium Society takes no responsibility for the claims or statements made by advertisers in this publication. Complaints against any advertiser herein should be forwarded in writing to the Editor, DELTA TALE.

Co-Editors:

Ruth Brewer

Susan Sprague

OFFICERS FOR 1977

President	Pete Tietjen	Corres. Secy.	Mike Sprague
Vice-President	Dave McInturff	Recdg. Secy.	Susan Sprague
	Treasurer	Gene Aldridge	

BOARD OF GOVERNORS

John Jessup	Ruth Brewer
Heinz Lenzen	Warren Garner
Pat Mahoney	Mark Prendergast
Steve Siska	Diane Nixon

Craig Tingen

TABLE OF CONTENTS

Volume 8	Issue 4
	<u>Page</u>
HEY MEMBER! - Silent Auction.....	1
Minutes of the Board of Governors.....	2
Bowl Show Report and Categories.....	3
Membership and Things.....	7
BAP Report.....	10
Featured Articles	
WAVES FROM THE CORAL REEFS	
By Ann Garner.....	4
ELECTRIC CATFISH AS PETS	
By Tom Heflin & Wendy Morrison.....	5
ANOTHER SPAWNING MEDIUM GREEN SAND	
By Dale Weber.....	8
LET'S GO METRIC	
By Bill Bishop.....	11

The cover drawing is a tracing by Michael Sprague of a slide by Ruth Brewer. The fish is a *Distichodus lusosso*. On page 13 is a drawing by Mark Lenzen of an *Epiplatys annulatus*.

## HEY MEMBER!

Have you heard about the new activity at the April meeting? If not, here is the word straight from the organizing committee.

April's meeting will include our 1st attempt at a silent auction. What is it? How does it work? A silent auction is an auction that is conducted directly between the buyer and the seller during a regular meeting without interrupting other activities. Here's how.

1. Each seller is limited to three bags of fish or aquarium related items.
2. PVAS will provide the seller with auction sheets. The seller will complete an auction sheet for each bag to be auctioned by indicating his name, the name of the fish or item to be auctioned, the bag number, and any minimum bids.
3. The bags and auction sheets will be placed on a table by the seller and left there during the auction.
4. To bid on a bag, the bidder will write his/her name and bid on the auction sheet accompanying the bag. Bids must be increased by increments of at least 25¢.
5. Bidding will begin as soon as the item is placed on the table and will continue until closed by the President at a preannounced time.
6. At the close of bidding, the bidder with the highest bid written on the auction sheet will be declared the purchaser.
7. The details of exchange will be handled directly between the seller and purchaser.
8. PVAS does not require a 25% commission as in other auctions; however, donations will be greatly appreciated.



## TRADING POST

2 5 gal. metal frame tanks  
1 29 gal. metal frame tank (poor condition)  
1 15 gal. metal frame tank (very poor)  
Will discuss price. I would prefer to barter for So. Amer. Cichlids or 20 gal. tanks.  
Dana Skibbie home 960-1686; work 751-0050

## Board of Governors meeting

April 5, 1977 8:00p.m.  
Steve Siska  
2223 Dairy Farm Rd.  
Gambrills, Md.  
261-7923

## MINUTES OF THE BOARD OF GOVERNORS MEETING

On March 1, 1977 the Board of Governors met at the home of Susan & Mike Sprague with 10 members and 1 guest present. Gene Aldridge reported \$456.41 in the treasury. He also discussed the mini-auction at last month's general membership meeting. We grossed \$115 with the club's share being \$28.99.

The next topic of discussion was the Spring Show. John Jessup & Mark Prendergast have designed a set up using cinder blocks and plywood. A list of materials is needed to see how many cinder blocks and how much plywood are necessary.

Pete Tietjen has drafted a letter to send to all pet shops in the area informing them of our future show dates; telling them we will be contacting them for raffle donations; and making a point of the trophy for dealer's set tanks to try to promote some interest in that class.

The Board decided to drop the 125 gallon tank raffle for the present time. Nothing had been done and there are too many other activities concerning the show to have the time to devote to the tank raffle.

There were many names suggested for judges and the corresponding secretary is contacting these people so that we may know our commitments in advance.

It was decided to start printing a value on the Delta Tale so people could understand how much the publication does cost. Also there is a possibility that some of the extra copies will be distributed to area pet shops in order to spark more interest in PVAS.

The D.J. O'Connell H.S. show was talked about. It will be in mid-April. It was decided that PVAS would donate 2 of our corresponding memberships to their raffle.

We will be having a silent auction at the April membership meeting. Details will follow in the April Delta Tale.

The meeting adjourned at 9:40.

Respectfully submitted,

Susan P. Sprague  
Recording Sec'y.

BOWL SHOW REPORT FOR MARCH

CICHLIDS

Central & S.A. Medium

1st Warren, K. -A. gaeyi  
 2nd Warren, K. -Rainbow  
 3rd Warren, K. -G. brasiliensis

Julidochromis

1st Lenzen, M. -marlieri  
 2nd Warren, K. -transcriptus  
 3rd - - -

Mouthbrooder, New World

1st - - -  
 2nd - - -  
 3rd - - -

- EGGLAYERS/LIVEBEARERS

Barbs

1st Heflin, T. -Tinfoil  
 2nd Leighton, T. -Cherry  
 3rd Donnelly, J. -China

Anabantoids

1st Garrett, R. -Kissing Gourami  
 2nd Heflin, T. -Kissing Gourami  
 3rd Garrett, R. -Blue Gourami

Goldfish/Koi

1st Leighton, T. -Choc. Oranda  
 2nd Mahoney, M. -Oranda  
 3rd Garrett, R. -Calico

	<u>Month Quarter Annual</u>			<u>Month Quarter Ann'l</u>			
Warren, K.	16	38*	38	Mahoney, P.	0	10	10
Terwilliger, J.	0	2**	2**	Garrett, R.	11	17*	17*
Sprague, S.	0	10**	10**	Brocato, M.	0	2	2
Lenzen, M.	6	6	6	Morrison, W.	0	6	6
				Mahoney, M.	4	4	4
				Donnelly, J.	2	2	2
				Leighton, T.	10	10	10
				Heflin, T.	10	10	10

\*Quarterly award  
 \*\*Error correction

Judges: Sprague, S. & Siska, S.

Judges: Garner, W. & Lenzen, H.

Bowl Show categories April 11, 1977

Cichlids  
 Central & S.A. Dwarf,  
 Other African, Open

Other Egglayer/Livebearer  
 Livebearers, non-guppy,  
 Killifish, Open

1977 BOWL SHOW CATEGORIES

Cichlids  
 May Angelfish  
 Tilapia/Seratherodon  
 Other Rift Lake

Other Egglayer/Livebearer  
 Sharks/Loaches  
 Catfish, non-corydoras  
 Guppies

June Haplochromis  
 Mbuna, non-pseudotropheus  
 Open

Tetras  
 Characins  
 Open



## WAVES FROM THE CORAL REEFS

By Ann Garner, FVAS

The marine aquarium offers a myriad of topics for discussion. Therefore, selections for this column, which we hope will appear monthly, will be by the author's preference and, in some cases, experience. Any requested topics will be answered to the best of the author's ability.

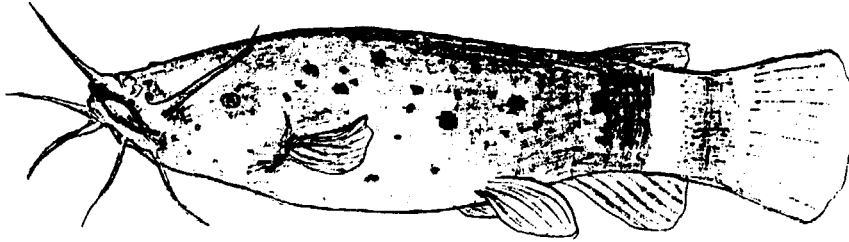
One of my favorites is the porcupine, Diodon hystrix, a member of the puffer family. While probably not winning any beauty awards, the porcupine is an extremely hardy and interesting tank acquisition. His large blue eyes, his trying to "talk" and smile and his "puppydog" response to his owner's presence make him a very loveable pet. The ability of the porcupine to inhale air and/or water and inflate his body, thereby causing the spines, normally smooth to his body, to become erect, is a deterrent to predators.

However, it should also be noted that Porky also has the disadvantage of being able to eliminate toxins, which can wipe out all tank companions, including himself. It is suggested that Porky share his space with his own kind. I would like to add that we had a community tank containing two porcupines (4 - 5 inches), a dogface puffer (4 inches) and a niger trigger (4 inches), who did extremely well together for over a year. We were careful to make sure that there was sufficient food and hiding places.

After trial and error, we found the most suitable tank arrangement was to allow a free swimming area in the front of the tank with coral and/or tuffa rock caves to the rear. Porky tends to "sit", pondering the problems of the world, for long periods of time. His large eyes are blinded quite easily, which is another reason for the hiding places. The Porky's aquarium should also receive less light than other aquariums.

A collecting trip to Chincoteague yielded several hundred ghost shrimp which, after an isolation period, were offered to the Porkys as a treat. They loved the shrimp, even the chase. Live brine shrimp, krill, frozen shrimp (cut up) and flake food comprised their basic diet. Another treat were small snails (from the freshwater aquariums) and small crabs (cheap kind).

In short, the porcupine is an excellent tank addition. Normally the cost is not "out of sight"; he is hardy, usually a good eater, very interesting, and can become as loveable as any other pet.



DM 3-13-77

### ELECTRIC CATFISH AS PETS

By: Tom Heflin & Wendy Morrison,  
PVAS

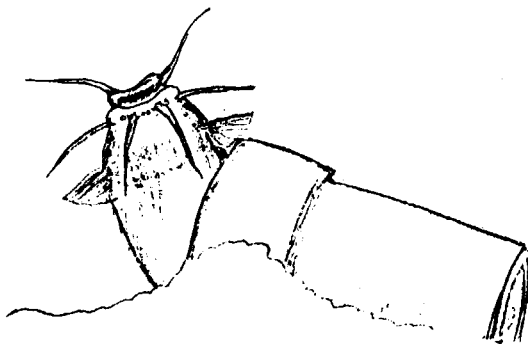
The electric catfish (*Malapterurus electricus*) is not commonly seen in home aquariums due to its shockingly anti-social behavior. It is capable of generating a powerful current which it uses to stun its prey and any fish that bothers it. However, when given its own tank it makes an excellent pet. We have one, and have found him to be hardy, easy to feed, not fussy about water conditions, and fun to watch.

His name is Voltaire. We acquired him during a fish buying trip to a local wholesaler, intending to use him as an attraction in a display tank. We had visions -- Voltaire hooked up to a light bulb, Voltaire connected to a door buzzer, Voltaire in competition with an electric eel -- but we soon abandoned such ideas. He became less display-like and more pet-like as we got to know him. Even his appearance, like a fat cigar with big lips and little piggy eyes, began to appeal to us.

Our change of attitude started when we noticed him rearranging the gravel in his tank. He would scoop up a mouthful and carry it around until he found the right spot, then spit it out and go back for another. One day the gravel would be level, and the next it would be all piled up on one side of his clay flower pot. The flower pot is his refuge when he is annoyed or upset. At first, any activity around him, such as changing the filter or lifting the cover to feed him, would send him wiggling backwards into his "cave". Thus protected, he would perform a little war dance to scare us off. We were afraid to touch him then for fear of being shocked.

Electric cats can give a severe shock when disturbed, in direct proportion to their size. A full-grown wild specimen three feet long can produce about 350 volts. A tank raised cat, not likely to exceed one foot in length, is capable of 150 volts, while a two inch baby can give off 30 volts.

Conscious of Voltaire's potential, we would cautiously drop in tubifex or earthworms, his favorite food, which he would suck in with the dispatch of an Electrolux. Soon he began coming up to the surface whenever a hand approached, anticipating a meal. As he grew tamer, we grew bolder, and began keeping hold of the worms until Voltaire came and took them. We were now hand feeding him earthworms, and took great pride in showing him off to everybody.



DA 3-13-77

He was only five inches long when we got him, but soon grew larger on his worm diet. Unfortunately, during the winter freeze we were unable to dig for worms, and we began putting live guppies in with him. These were largely ignored, so one day we dropped in a dead mollie, not really expecting him to accept non-living food, particularly such a large helping. When we looked in on him a few minutes later, the mollie was gone and there was a noticeable bulge in Voltaire's midsection. Thus encouraged, we tried other foods, and he began accepting anything offered by hand, including goldfish, brine shrimp pellets, mealworms (reluctantly) and even a little flake food.

By this time he was so friendly he would stretch out his barbels and lightly touch and then kiss our fingers, hoping to find goodies there. Occasionally, when feeding him goldfish, we felt a very mild tingle of electricity, almost unnoticeable. He now rarely shocks his food or us, and when he is in a good mood we can even touch his head and body with impunity.

We recently bought another young electric cat which Tom attempted to feed by dangling a dead goldfish in front of it. In contrast to Voltaire's gentle behavior, this one gave him a jolt that reached up to his elbow, even though he was only holding on to the tailfin of the goldfish. After swallowing the offering, the cat discouraged further intimacies with a war dance much like Voltaire's earlier performance.



Voltaire is now seven inches long and still growing. When his belly is full of goldfish he measures two inches in diameter. His appetite is enormous; some days he eats ten or more goldfish. When he wants food, he stands straight up, tail on the gravel, his mouth just below the surface of the water, without moving. When he is rewarded with a fish, he takes it and swims into his flower pot like a dog with a bone, emerging a few seconds later to resume begging until his hunger is (temporarily) satisfied.

Between meals he either rests in his cave or lies motionless on the gravel, half on his side, as if dead. This used to scare us until we realized it was just his way of relaxing. The latest development in his behavior is nudging our fingers with his head and back. We can't help but compare this with a cat wanting its neck scratched.

Lest this very unfishlike behavior -- back rubbing, begging for food, finger kissing and tank redecorating -- seems just too much to believe, we invite any skeptics among you to stop by and see for yourselves. Voltaire loves company.

#### Membership and Things

By Mike Sprague, Corr. Sec.

Hi! Remember me? I'm the guy who's last monthly column appeared in January. My closing statement was, "I'll get myself organized soon." Since this is now April, you may conclude that:

- a) I am still not organized or
- b) I have organized myself enough so all of one month's obligations can be completed in a mere 90 days.

Organized or not, I was kept very busy during the March general meeting. Those of you who missed the meeting missed a lot of people both new and old to PVAS. Prior members Pinchos Andreen, Bob Smith and Bill Trout rejoined the ranks. New members Dana Skibbie and Bob Tyler and family joined PVAS for the first time. Both indicated a desire to become involved "working" members of PVAS. I'm sure that we of the Board will be happy to put these workers right to work.

Of course, the life blood of any society is the renewal of existing memberships. March produced renewed family memberships by John Jessup, this year's past president, and Ronald & Carolyn Lorusso.

Now, we need some more of that life blood. The following "donors" are requested to complete a membership application and submit it with their dues to me since their memberships expire as follows:

February - Caroline Spahr, Gary Tevendale

April - Jerry Donnelly, Gary Haas, Jim Long, David & Janet McInturff, Pete & Pat Tietjen, Mrs. Gordon Young

All donors may save 13¢ postage by coming to the April meeting and handing me their applications and dues. See you there.

(Editor: Here is an article for those of you who just got some green sand from Ruth. Good luck!

ANOTHER SPAWNING MEDIUM  
GREEN SAND

By Dale Weber  
Reprinted from the Journal of the AKA, Jan. 1977

For the most part, killie buffs use peat moss as the sole spawning media for the bottom spawning killies (ploughers). Peat moss is the rule and materials such as silica sand, crushed walnut shells, fine granulated charcoal, etc. are the exceptions. So I naturally became a firm "peat-believer."

At the AKA Convention I heard a lot about a different media that is used extensively by some hobbyists on the East coast--green sand. I understand this was nothing new to AKA members but evidently it had become a fad and past from the scene before I seriously became interested in killies.

I would like to share what information that I have with you. The best way I could do that would be to share a portion of a letter from Charlie Nunziata who very graciously answered my initial inquiries...

"...Regarding green sand, I first became familiar with this material through an article written by Rosario LaCorte, in a special issue of Killie Notes on South American Annuals. I can't check the references as I'm writing this from my office but I believe it was November, 1973.

"Green Sand" is, I believe, simply a common name which is used here in the east but may not be used in your part of the country. The material is a natural marl which is mined in New Jersey and is used as a fertilizer for potted plants. I believe it contains Potassium along with other natural mainerals. In the dry state it is a medium shade of green, and when wet turns a very dark green. The size of the granuals are quite small and packing does occur in use. This makes the material unsuitable for the deep divers but rather well suited for the ploughers. The value of the material is three fold:

1. Because it is so dark when wet, the fish do not bleed out as they would over silica sand.
2. The eggs are easily harvested.
3. The fish seem to take to it readily as I have had no difficulty in breeding several species on it. The list of fish that I've bred over green sand would be quite long, but, as an example, the following have been successfully spawned: N. korthausae, N. rachovi, N. neumani, N. kirki, N. furzeri, etc.

Most of the bottom spawning Aphyosemions can also be successfully spawned over this media. Some of the more notable are A. puerzli, Blue Gularis, A. walkeri, etc.

The material is very cheap here, a 50 pound bag sells for approximately \$4.00. 50 pounds will probably last a lifetime and then some. It is totally inert as far as I can determine, and has no odor whatsoever. The only drawback and it's a minor one I believe, is that it takes some effort to properly clean. In it's mined state there are many very small clay particles mixed in with the marl. When initially wetted, this clay comes out of solution, being lighter than the marl, resulting in a green cloud in the water. I simply put a few handfuls in a plastic juicer type container, run water in it and continue to pour the clay laden water off until relatively clean. I don't take too much time in doing this because if one were to wash until all traces of the clay were eliminated, it would take several hours. As a result I only clean to the point that the water is relatively transparent, and I can see the sand at the bottom of the container. This is something that you will get a feel for as you use the material. I don't believe these clay particles have any effect on the fish, because under dire circumstances I've placed unwashed green sand in the aquarium and, although it turned the aquarium a milky green, the fish were not affected.

After the sand is washed, simply place it in a plastic cup to a depth of approximately 1" and then into the aquarium. After a few hours the fish seem to realize what the sand is for and breeding will begin, assuming the fish are in good condition. You can easily see whether breeding has taken place because the surface of the sand, which is smooth when you first put the cup in the tank, becomes ridged with small depressions here and there. If the spawning activity is very vigorous you will see the sand substantially displaced.

Harvesting is a rather easy task, as follows:

Take a fine net and place it over a container of some kind so that when you pour water through the net it will be caught by the container. Take the cup of green sand and initially, without disturbing the sand, pour off the water into the net and examine for eggs. You will find mostly debris at this point. Wash out the net and replace it over your container, go to your tap, (the net/container set-up should be next to the sink) and set the tap at moderate flow, put the container under that tap so that the flow of water dislodges the sand swirling it around in the cup and continue until the water level is just below the surface of the cup. Do not allow the cup to overflow. This action will break the eggs free of the sand so that they will float in the water. Quickly pour the water off into the net. Continue doing this until most of the eggs have been harvested. After a bit of practice, you will obtain mostly eggs in the net and very little sand.

The advantages of this method are obvious in that you can see what you have. Water incubate the eggs for a couple of weeks, remove the fungused ones and pack in peat moss in the normal fashion. I, and a few others here, have been experimenting with Notho eggs by incubating them in water until they are fully eyed up and placing them in peat from 3 to 6 weeks thereafter, we find that the net incubation time is greatly reduced and the yields are quite high..."

As you can see that the possibilities are seemingly limitless. I do not know the comparative success ratio to peat moss but the ease of maintenance factor would seem to more than compensate for a disparity if one existed. Also if you were going to list eggs in the F&E, the green sand system would seem more feasible. Up to this point, I have not been able to find "green sand" locally but if someone out there can give me a lead it would be appreciated.

I was able to get a small quantity for experimentation. I set up N. korthausae over some "green sand" and harvested as suggested by Charlie Nunziata. I was impressed with the results, plus there is something very reassuring about knowing the exact number of eggs and how many fry to expect. I hope you find the information on "green sand" interesting. Maybe we might have shaken a few "peat believers"...Thanks, Charlie.

For information concerning joining the American Killifish Assoc. write the Membership Chairmen, Jerry & Bev Sellers, P.O. Box 4231, Sarasota, Florida 33578.

# bap REPORT

NAME	POINTS
Susan & Mike Sprague	155**
Ruth Brewer	240**
Gene Aldridge	80
John Jessup	55*
Diane Nixon	70*
Pat & Pete Tietjen	15
Jan & Dave McInturff	365***
Jerry Donnelly	10

- \* Breeder Award
- \*\* Intermediate Breeder Award
- \*\*\* Advanced Breeder Award

#### Spawnings:

Brewer - Golden Pheasant, *A. walkeri*  
McInturff - Peacocks

Dave McInturff  
BAP Chairman

## LET'S GO METRIC

By Bill Bishop ✓  
Reprinted from The Nekton  
March 1976

While calculating the dimensions of some new tanks I am building, the thought occurred to me that "Hey, we ought to be going metric!" A little additional study assured me that not only is the metric system of length easy to master, but that the system leads naturally to measures of volume, weight, and, if needed, measures of heat. Further, I discovered that as needed I could convert, roughly, back to the Imperial or U.S. systems of measurement.

In the paragraphs below I shall attempt to relate to the reader the portions of the metric system the aquarist is most apt to use by means of practical, rule-of-thumb examples. The appropriate tables and definitions will, of course, be included. The fundamental unit of length in the metric system is the meter. This length is close to a yard, being 39.37 inches. The most used sub-unit of a meter is the centimeter (cm); there are 100 of these in a meter. A most useful piece of information is the fact that there are about  $2\frac{1}{2}$  cm to an inch (2.54); this means that 25 cm is about 10 inches. Going the other 10 cm is very close to 4". As shall be shown later the 10 cm length, or one decimeter (dm) may be very useful to an aquarist.

Now, the most important number in the Imperial system is 12. There is a good reason for this; no other number can be divided into so many even parts (ask your daughters why there are twelve jacks). Checking the dimensions of my tanks I discovered that they have measurements of 4", 8", 12" or multiples of these. These same measurements are, in the metric system, 1 dm, 2 dm, or 3 dm. Thus, a cubic foot, 12" on a side, in the metric system would be 3 dm on a side. Whereas in the English system the cubic foot is the basic unit of volume, in the metric system the liter (l) plays that role. A liter consists of 1000 cubic centimeters (cc) or a cube one decimeter on a side. Thus, one liter in volume is close to a 4" cube. Returning to our cubic foot, 3 dm, on a side, it is seen that one cubic foot is about  $3 \times 3 \times 3 = 27$  liters.

Turning to liquid measures, the metric has a clear advantage. In the English system the gallon is used, consisting of 160 fluid ounces for the Imperial gallon and 128 for the U.S. gallon. In the metric system the liter is also the basic liquid unit. Thus our cubic foot will contain 6.229 Imperial or 7.481 U.S. gallons (awkward, right?) or 27 liters as before. For a crude conversion from liters to gallons divide by four.

Now, how much does this cubic foot weigh? If you've been calculating in U.S. you need to figure 8.345 pounds per gallon (good luck!). If you were smart and used the Imperial gallon, the calculation is easy--10.0 pounds per gallon. In the metric system it is also easy. One liter of water weighs one kilogram (kg), meaning 1000 grams (one gram per cc of water). Again our cubic foot weighs kilos (short for kilogram). Now a commonly used, but unofficial, unit of weight in Europe is the metric pound. It consists of 500 grams or half of a kilo. This unit is about 10% greater than our pound (454 grams). One kilo is about 2.2 Imperial pounds. Thus, to get a rough estimate of the cubic foot in our pounds, just double the number of liters and add 10% to the result. This is about 59.40 lbs.

Now let's do one calculation straight through to see how the system works, assuming all we have is a pencil, paper, and a 12" ruler. Consider my 15 gallon (U.S.) tank. It measures 12" by 12" by 24". In decimeters it is 3dm by 3dm by 6dm which gives  $3 \times 3 \times 6 = 54$  liters. This weighs 54 kilos or about  $54 \times 2 = 108$  plus 10.8, or 118.8 pounds.

What about temperature? Temperature is measured in degrees centigrade ( $^{\circ}\text{C}$ ) in the metric system. Here, there are 100 degrees between freezing and boiling; freezing occurs at  $0^{\circ}\text{C}$ ; boiling is at  $100^{\circ}\text{C}$ . The temperature in centigrade can be calculated from Fahrenheit ( $^{\circ}\text{F}$ ) by the formula  $^{\circ}\text{C} = 5/9 (^{\circ}\text{F} - 32)$ . The reverse may be done by:  $^{\circ}\text{F} = 9/5 ^{\circ}\text{C} + 32$ . A close estimate may be found by doubling the degrees centigrade plus 10% and adding 32. A table of temperatures from  $70^{\circ}\text{F}$  to  $85^{\circ}\text{F}$  in centigrade is given below. One final note: 40 below is 40 below in either system.

Finally, a word about heat. Remember those things women are supposed to count, called calories? A calorie takes on real meaning in the metric system. A calorie is the amount of heat required to raise one cubic centimeter of water one degree centigrade.

For those who find calculations distasteful the tables below have been composed. With these we should be able to use the metric system with ease.

#### Measures of Volume

Pt. <sup>3</sup>	Liters	Imp. gal.	U.S. gal.	# water
1	28.316	6.229	7.481	62.3
2	56.663	12.458	14.961	124.6
3	84.948	18.678	22.44	186.9

### Measures of Length

Inches	Centimeters
.39 (3/8)	1
1	2.54
2	5.08
3.94	10 (dm)
4	10.16
6	15.24
8	20.32
10	25.4
12	30.48
36	91.44
39.37	100

### Measures of Liquids and Weights

Imp. Gal.	U.S. Gal.	Liters (kilos)	Pounds
.220	.264	1	2.2
.833	1	3.785	8.3
1	1.201	4.546	10.0
1.1	1.321	5	11.0
4.163	5	18.927	41.6
4.4	5.283	20	44
8.327	10	37.854	83.3
10.999	13.209	50	110.0
12.490	15	56.781	124.9
16.654	20	75.708	166.5
17.598	21.13	80	176.0
20.818	25	94.635	208.2
21.998	26.417	100	220.0
24.981	30	113.562	249.8

### Temperature

°F	°C	°F	°C
65	18.33	77	25
68	20	78	25.56
69	20.56	78.8	26
69.8	21	79	26.11
70	21.11	80	26.67
71	21.67	80.6	27
71.6	22	81	27.22
72	22.22	82	27.78
73	22.78	82.4	28
73.4	23	83	28.33
74	23.33	84	28.89
75	23.89	84.2	29
75.2	24	85	29.44
76	24.44	86	30

