

**MEETINGS, NETS and SERVICES****Club Station:** VK4WIS**Club Repeaters:**

Maleny: VK4RSC on 146.850 MHz &amp; 438.075 MHz.

Peregian Beach: VK4RMB on 146.825 MHz &amp; 438.175 MHz.

Gympie: VK4RGY on 146.625 MHz &amp; 438.825 MHz.

Bli Bli: VK4RSN on 53.700 MHz

**General Meeting:** Monthly on the first Tuesday at 7:30 pm in the Club House, old Toll Plaza building, 85 Godfreys Road, Bli Bli.

Visitors are welcome to attend.

**Weekday Meeting:** Weekly at 10:00 am on Wednesday.**Good Morning Net:** Daily at 8.15 am at VK4RSC on 146.850 MHz.  
Conducted by various club members.**Tech Net:** Weekly at 8:30 pm Sunday at VK4RSC on 146.850 MHz.  
Check in, raise topics and ask your technical questions.**80 m Net:** Weekly at 7:30 pm Thursday on 3580 kHz.**10 m Net:** Weekly at 8:15 pm Wednesday on 28.470 MHz.**6 m Net:** Weekly at 7.30 pm Friday at VK4RSN on 53.700 MHz.**2 m Net:** Weekly at 7:30 pm Sunday on 144.300 MHz SSB.  
Conducted by club station VK4WIS.**QNEWS:** Relayed Sunday at 9:00 am at VK4RSC on 146.850 MHz.  
After the broadcast a callback is conducted by VK4WIS.**Internet:** [www.vk4wis.org](http://www.vk4wis.org)

This website provides previous issues of Pelican Droppings in full colour in pdf format which can be downloaded.

The current issue can be had by subscribing to the email edition in pdf format. Apply to SCARC.

**EchoLink:** Available on VK4RSC 146.850 MHz.

The Internet station is VK4AKA-R and the node is #195107.

# Pelican Droppings

**Newsletter of the Sunshine Coast Amateur Radio Club Inc.**

Issue No.81

December 2005-January 2006

**RedSun Rally Result**

Geoff Sanders VK4KEL presents the annual shield to the winner, Chris, from the Redcliffe club.

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**NEXT ISSUE**

We will report on the progress made for the repeater to be located at Mt. Wolvi. Appearing too will be the final selection of stories from June Sim's China Odyssey.

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## Presidential Preamble

Welcome to all this month's readers. It's good to be back home after a month travelling in VK3 land.

The revised licence levels have now been introduced including the new Foundation Licence. I have heard a few four letter 'F' calls on HF and some 'Standard' calls as well. We should make them welcome to their available bands. Please tell people you meet about the new Foundation Licence so we can bring new amateurs onto the bands. Congratulations to Harvey VK4AHW who is our Certified Examiner for all licence levels.

Thanks to the members who have made the initial inspection and commencement of work on the new Mt. Wolvi repeater site.

The Redsun Rally was enjoyed by all who attended. The story begins on page 3 opposite. We need more foxhunters for next year. Please contact the writer or Harvey VK4AHW if you are interested. The club owns spare fox-hunting gear, so no money outlay is required to try out.

Clubroom happenings:

The workshop has had shelves fitted above the main bench. Does any member have one of more old car road that we can paint up and mount high on the workshop wall to be used for hanging coaxial cables?

The library continues to grow. New bookcases have been installed all over the place. Max VK4VZ told me that we currently have over 700 books. So please use the information in these books that cover other subjects as well as electronics.

Joe VK4SY is still hard at it in the 'South Yarra' store. If you need any components for a project see Joe.

Members are working on another computer for the Green Room. It will be used for transceiver control and digital transmission modes, i.e. PSK31 etc., on equipment already installed in this radio room.

Coming events:

The Christmas Break up will be held on our regular club night meeting on Tuesday 6th of December 6:00pm 2005 at the clubrooms.

The next Sunday meeting will be held on the 18<sup>th</sup> of December 2005 starting at 9:00am. BYO BBQ.

Our January 2006 Club night meeting is on Tuesday 3rd at 7:30pm at the clubrooms.

That's enough from me. I hope all those that are not feeling well improve soon.

73 all, Ray

early trans-Atlantic telegraph systems and were also used in a device called an oscillograph to make a graph of current versus time on a moving photographic film.

Awarded the Legion d'Honneur in 1884, d'Arsonval remained director of the laboratory at the Collège de France until 1910, when he moved to a new laboratory at Nogent-sur-Marne. He remained there until his retirement in 1931 when he received the Grand Cross. In 1933 the French Ministry of Education held an official celebration for him at the Sorbonne. He died in 1940. End

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Integrated Circuits, continued from page 13

and this makes it possible to generate circuits and electronic functions that would be quite impossible using discrete components.

Silicon is used as the substrate of most ICs and most high-speed digital and analogue circuits are based on bipolar junction transistors. The highest density ICs such as microprocessors and memory chips use MOSFETs and some ICs use a combination of technologies eg JFET transistors for low noise and high speed combined with bipolar transistors for high output power. ICs can be divided into several different 'sizes'. Small-scale integration (SSI) refers to circuits containing up to about ten components and these had been developed by 1968. Medium-scale integration (MSI) circuits containing 10 to 100 components soon followed and by 1970 large-scale integration (LSI) circuits containing several thousand components were being made.

In 1971 Intel produced the first microprocessor chip, containing all the arithmetic, logic and control circuits necessary for the processing unit of a computer. Since then the number of components on a single IC has been doubling about every two years or less. Very large-scale integration (VLSI) circuits contain more than several thousand components. Many of us will remember the early (1984) IBM personal computers which operated with a 286 (80286) processor containing about 200,000 transistors. The 386 with 300,000 transistors and the 486 with over 1 million transistors soon followed. An example of a modern VLSI circuit is a Pentium 4 processor which contains over twenty million transistors in a chip about 20 mm x 20 mm.

Often, for a few dollars or less, it is possible to get off the shelf an IC to do a job which would have been a major undertaking or impossible just a few years ago. ICs have made our modern industries and lifestyles possible. Radio receivers and transmitters, TVs, digital cameras, laptop computers, MP3 players, car fuel injection systems, GPS receivers – everywhere around us are technological miracles that our parents could not even have dreamed of, all made possible by the ubiquitous integrated circuit. Thanks, Jack Kilby and rest in peace. End

## Famous Personalities: Galvani and d'Arsonval

Meters are instruments that we use so often, yet are probably take for granted. Did you ever stop and wonder how your humble analogue voltmeter actually came to be invented?

It all started with an Italian man called Luigi Galvani (1737 – 1798). Galvani was a biologist at the University of Bologna and in 1782 he found that if he applied an electric charge from a Leyden Jar (an early type of capacitor) to the nerves in a frog's leg, the leg would jump, even when it was no longer attached to the frog. This is hardly a meter, but it does establish the principle of an electric charge generating movement and more importantly for Galvani, showed the electrical nature of the nerve-muscle function. His name lives on in the galvanometer and in our expression 'to be galvanised into action', describing someone suddenly and abruptly driven to action.

The most important player in the development of the meter came on the scene some 70 years later. This was Jaques-Arsène d'Arsonval, born in 1851 at Saint-Germain-les-Belles, France, into a very old and noble family. After studying at the Imperial College of Limoges he went to Paris and became friends with a famous physiologist Claude Bernard. After Bernard's death he replaced him at the Collège de France.

Amongst other things, d'Arsonval studied the use of high-frequency currents to treat diseases of the skin and mucous membranes; but his most outstanding scientific contributions involved the biological and technological applications of electricity and much of this work concerned muscle contractions, based on the work of Galvani. In 1882, in order to further his research, he invented the thermocouple ammeter and the moving-coil galvanometer, tools which helped establish the science of electrical engineering. His galvanometer became the basis for all modern analogue meters.

A galvanometer is an analogue measuring instrument which produces a rotary motion in response to an electric current flowing through its coil. It uses a small pivoting coil of wire in the field of a permanent magnet. The coil is attached to a thin pointer that moves over a calibrated scale. A spiral spring pulls the coil and pointer to the zero position. When a direct current flows through the coil, it generates a magnetic field which interacts with the field of the permanent magnet. The coil pivots, pushing against the spring, and moves the pointer over a scale indicating the electric current. To help eliminate parallax errors, good quality meters often include a mirror next to the scale to assist in getting an accurate reading.

A mirror galvanometer is a very sensitive meter where a mirror is used instead of the pointer. A beam of light reflected from the mirror acts as a long, weightless pointer. Mirror galvanometers were used as receivers for

## Foundation Licence Training

The new entry-level exam into the fascinating hobby of amateur radio is the easy way to get started. There is no Morse code requirement, and the study required is minimal, with only a 25 question multiple choice Theory/Regulations exam, and a ½ hour Practical Assessment on a few basic operational practices. Harvey Wickes VK4AHW has been appointed as official assessor for SCARC, so all exams can now be assessed on the spot and instant feedback is available straight after the exam.

Currently Harvey is running training sessions each Monday evening at 7:30, in the club rooms, 85 Godfreys Road, Bli Bli. All prospective Foundation Licence operators are invited to join the 8 students currently attending these free classes. While studying, each student is entitled to all the privileges of club membership. The WIA training manual/textbook is now available at the special cost of \$15. End

## The RedSun Rally, 2005

By Harvey Wickes V4AHW

This year's RedSun Rally was held on Sunday, 20<sup>th</sup> November. The day dawned full of promise, with warm, sunny, cloudless skies to greet us. Geoff VK4KEL and Jenny had been hard at work, mapping out the Observation Run and compiling the often-cryptic questions that were to be answered. They were not to know that the owners of the Reef Explorer had decided to take it out fishing this very weekend (first time in 3 years), when we needed its rego number. "You can't help bad luck, eh?"

Mike VK4YFL and Joe, VK4SY got to the Clubrooms early and tidied things up, in preparation for the lunch hour rush. Meanwhile, at the Ettamogah Pub, the teams from both clubs started to arrive. SCARC was represented by Richard VK4YRP and Win, Gordon VK4VP and Kate and the Little Takker, our president Ray VK4YRS, Carole and Harvey VK4AHW. The Redcliffe folk outnumbered us with about six or seven carloads of enthusiastic observers, but we matched their enthusiasm as we headed out of the car park.

We enjoyed the pleasant drive through the back blocks of Eudlo and Palmwoods, over Kiel Mountain and on to the clubrooms for a great BBQ lunch. The weather stayed hot and sunny, so we all sat around in the shade outside, where a good time was had by all. The car park was full and overflowing, with probably in excess of fifty people all enjoying the social interaction.

After a very pleasant lunch, and the eventual

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## Building the Elecraft K2 Kitset HF Transceiver

by Bill Scovell VK4SQ

Elecraft is a small electronics company located in Aptos, California established in 1998 by two enthusiastic amateurs Wayne Burdick N6KR and Eric Swartz WA6HHQ. The 'Ele' part of the name is pronounced the same way as in 'elegant'. Their first product, and still the flagship of their range of products, is a kit set, amateur band only, HF transceiver: the K2.

Not since the halcyon days of Heathkit has the amateur fraternity had available kit sets of such quality. With sales of the K2 now on track towards 6000 units most U.S. amateurs you talk to know about Elecraft. Outside the U.S. the name will probably not evoke a response unless you are talking to a dedicated QRPer, but this will surely change as there are now distributors in Germany and Japan. At this time there are probably more than a dozen K2s operating under the Southern Cross.

By foregoing general coverage and limiting the receiver to only the amateur bands, Elecraft have avoided the economic up-conversion to a high first I.F., which is generally employed by their competition – Yaesu, Kenwood and Icom. When coupled with low local oscillator phase noise, this has enabled them to produce a single conversion receiver with very impressive specifications that have attracted the favourable attention of many serious contesters and dxpeditioners. Comparison of the receiver specifications with those of high-cost black boxes from Japan is quite amazing, particularly when the cost element is factored into the equation.

The basic K2 is an 80 to 10 metre, ham band only, 10/15 watt CW transceiver which can be optioned for SSB, 160 metres and the recent 5 MHz band.

An onboard ATU, Noise Blanker, analogue or DSP audio filter, an internal SLA battery pack are other available options. The top cover of the basic K2 can be replaced with the K2-100 that produces 100W of RF output.



Fig.1 Elecraft K2 front panel

We managed to tether the loop with good quality nylon rope, tied loosely, so that the wire can slip through the tethers as required. The quality of the nylon rope will be confirmed in a few years after the UV has had a go at it. OK, now for the good bits. How does it work? After quite a few QSOs on 80, 40, 15 and 10 metres, I can report that it works extremely well, especially when compared with my Carolina Windom. I had to fiddle a bit with the EAT-300 manual ATU for 10 metres, but I finally found the sweet spot and the guys on the 10 m net told me they had never heard a better signal from me in the past. On 80 and 40 signals are noticeably quieter and about two S-points above the Windom. I have had no trouble loading it up on the WARC bands, and as I write this, I have just tried it on 6 m, and it loads up nicely there too. When there are some 6M men around I will get some reports. For what it is worth, I cannot find a frequency where I can't get 1:1 SWR using the EAT-300. To sum it all up, I am impressed with the loop antenna.

Now, here is something to think on. If Ron VK4GZ is correct, and I believe that he is, there is no substitute for 'wire in the sky'. If the loop antenna pundits are correct, the gain increases with the size of the loop, so the next step is to try a 160 m loop. As I lay in bed last night, a thought struck me. Why not try a 2-turn loop? It should tune to 160 metres and take up the same size as an 80 metre loop. Richard VK4YRP had the same thought, proving that great minds think alike. Has anyone ever read anything in the antenna books about two turn loops? I can't recall having done so, but now I can't wait to try the idea out. Or maybe Richard, with his nice big block, can try it out and report back. Keep watching this space. End

## Integrated Circuits

A PD Tech Review by Tony Thorrold VK4KKY

With the death of Jack Kilby, the inventor of the integrated circuit, in June 2005, this is a fitting time for us to look at integrated circuits and their development. Until 1947 all active electronic circuits contained vacuum tubes. The invention of the transistor dramatically changed this and by 1958 the first integrated circuit (IC) had been made.

#By definition an IC, popularly called a 'chip', is "a complete circuit including active and passive components and their interconnections, manufactured on a single substrate". It is very much smaller than an equivalent circuit made from discrete components. The circuit, comprising transistors, diodes, resistors, capacitors and interconnecting 'wires' is directly built up in a thin slice of material called the substrate. Each component is microscopic in size

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## Going Loopy

by Harvey Wickes VK4AHW

Well, it has finally happened. After thinking about it for about five years, and being encouraged by several local Hams to 'put up a loop antenna', I finally got around to it.

Mike, VK4YFL kindly donated his services on his rostered day off last Monday, and between us we put up a full-sized 80 metre loop. Actually, it ended up being 81 metres of green/yellow plastic coated multi-stranded copper earthing wire. When checked out it indicated resonance at 3.5 MHz exactly, so I was happy to leave it that way for the time being. If you want to try a loop without spending too much on wire, have a look at the rolls of Garden Wire sold at your local hardware store. That stuff is strong, cheap, galvanized, easily soldered and available in several convenient diameters. The thin stuff is almost invisible too, which is a bonus.

All the good books have quite a bit to say about the loop antenna and its characteristics. So far, I can confirm that most of what I have read on the subject appears to be accurate. Just to recap: the experts say that height above the ground is not all that important, as long as you can manage 3 metres or more. They also say that it is best to feed them at or near a corner, given that the final layout is a square or a rectangle. It seems that this too is not overly critical, and my loop ended up being fed at about the middle of one side, with no observable ill effect. It is also claimed that they radiate a lot of energy straight up, and are generally considered to be omnidirectional; i.e. equal gain in all directions.

There are other claims made too that are worth mentioning. They are said to be simple, cheap, non-critical antennas, with good all-band performance and low-noise characteristics (Did you notice the cheap part?). What could be simpler? Even feeding them is a snack! I simply used a convenient length of 50 ohm co-ax, with the braid fed to one side and the centre-conductor fed to the other side. Just as a precaution, I looped the co-ax feed line into a four-turn current balun, just short of the feed point. Another claim made for this antenna is that the actual shape of the loop is not too important. It can be square, rectangular, hexagonal, whatever your real estate dictates. The gain is supposedly proportional to the area enclosed within the loop.

My loop ended up being a slightly trapezoidal square, with five tethering points to convenient sky hooks around the house. These turned out to be four trees and one J pole on the front corner of the house. 'What's that thing there for?', asked XYL Judi, who notices these things, bless her cotton sox! She also appreciated the lopping of some of our overgrown trees.

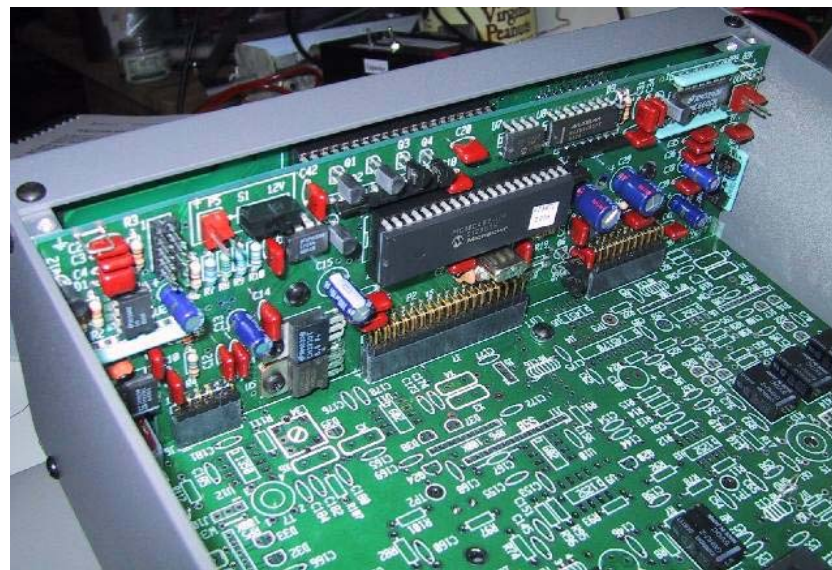


Fig.2 Control board in place behind the front panel

Since its launch over five years ago Wayne and Eric have invited criticism and suggestions for improvement of the product and there have been a number of these, blessed by the designers, and for which Elecraft have made available update packages and it is their proud boast that if your K2 bears the serial number #500 for just a few dollars you can bring it up to exactly the same specs as a new kit being sold today bearing serial #5500.

'Is it difficult to build? I think not - I've built two, ...'

Is it difficult to build? I think not - I've built two, the first one, as far as I know is still with a South Australian electronics company who bought it from me to use as a performance reference against which they measured other competing products.

A number of builders claim to have built the kitset in around 40 hours. I took more like 60 hours, but I'm not the fastest thing on this earth (ask my XYL). Both the electronic and mechanical design of the K2 can well be described as elegant, comprising three PCBs that plug into each other. The only off-board wiring is the leads to the loud speaker.

You don't need any special test gear to complete and align a K2, beyond a DMM; in fact you could, perhaps, get by without the DMM because the circuitry incorporates both a frequency counter and a digital voltmeter. However, a DMM is handy, as it confirms the value of those 1/4 watt resistors when the peepers don't quite sparkle like they used to do.



Fig.3 The main RF board—almost ready for installation

The pictures will give an idea of the general tidiness of the design. The front panel is shown in Fig. 1. Fig.2 shows an unpopulated main board into which the other two boards have been plugged and Fig.3 shows the main board before assembly. It's almost complete, with just a few more toroids to wind and install.

For me building the K2 has been a most rewarding experience as I now have a piece of gear that I won't be afraid to service if ever the need should arise. I never had that feeling with the several black boxes that I have owned!

The Elecraft URL to their website is [www.elecraft.com](http://www.elecraft.com). If you want a hands on 'look see' I'll be happy to oblige. End

### WANTED

100 W HF transceiver in working order for mobile use.  
Any well-known brand: Alinco, Icom, Yaesu or Kenwood  
(e.g. TS 440).

Phone Vin Childs at home on 5476 0383.

waist, one on her hip, another strapped to her ankle, one on her shoulder, and another on her back. She also had a drum on the back of her neck, another drum across her chest and a final one was on top of her head. They were all double-ended drums, and she danced and beat out a rhythm on each drum as she whirled around without missing a beat. It was very entertaining.

Back to the bus again and this time it was a drive to the new terminal of the Xi'an Airport. We stopped along the way to visit a cave house village just off the toll road to the airport. This was a better class of cave house as they had faced the front of the houses with tiles. We had to climb a very rough dusty track to the houses and, once inside the courtyard of one of the houses, we could see just how spare and primitive was their living. One cold water tap was piped to the middle of the yard and the kitchen consisted of a lean-to with a coal burning stove. Several woks and pots were on a makeshift cupboard and side dresser.

We were then invited to enter the one living-room/bedroom with a bed platform formed out of the earth, two chairs, a small table and a cupboard on which a TV stood. Power was available to this village and a lead provided power to the TV and an overhead light. The doors and window coverings were pieces of material cut to size. An open window had been cut into the earth wall. Another room had been hollowed out and was the winter storeroom for their food. No individual toilets existed in this village; a communal one was built in the field between the cave houses and the road. No shower or bathhouse was evident, and I guess the clothes would most likely be washed in a bucket or taken down to the river nearby.

Before boarding our one hour flight to Chongqing, we had dinner at a restaurant beside the airport. From the Chongqing Airport, we had a hair-raising 45-minute drive to the 4th largest city in China, with a population of 32.5 million. We checked into the 5-star Holiday Inn, where, from the 17th floor, I had a hazy view of the hilly city spread out before me. Our local guide here was "Johnson"; Chinese name Yang. End

RedSun Rally  
continued from page 3

arrival of Tail End Charlie and his crew, it was time to get ready for the foxhunt. Out came all the secret weapons, and it was then that we heard that Redcliffe had recently had a big club project, where they constructed no less than ten Sniffers. Geoff and Jenny took off to hide the Fox and soon it was on for young and old. The SCARC team numbered only two cars, whilst the Redcliffe mob formed their own little traffic jam.

Within about twenty three minutes, young Chris from Redcliffe had located the Fox. Richard and Win had given up, with their sniffer overpowered by mains hash. Harvey, Ray and Carole finally found their way up to the water tower, near Angus VK4KMC and Liz's place, about twenty minutes later. The cunning Fox had taken up residence in a pile of rocks, just over a local's fence. We are looking for a few new starters for next year's effort, when we plan to come home with the trophy. End



Bronze chariot and horses from Emperor Qin's Mausoleum

where there were beautiful original works on display and for sale. I purchased two works depicting autumn tones and cranes in fine detail. From the art gallery we walked to a musical fountain. This was a huge area with water spouting and cascading in time with musical pieces. There were hundreds of people enjoying this spectacle, and, as it was a warm day, many of the younger ones were down among the spouting fountains of water. This was most enjoyable and we stayed to the end before boarding the bus for a ride back into town and a lunch at a Muslim Restaurant. Again, this was a multi dish meal, but without pork or ham.

After this meal we walked through the Xi'an Muslim Quarter, through narrow lane ways and streets full of merchants, all trying to sell us their wares. Our only escape was to enter the mosque, passing through a 600-year-old gate. It was strange to see so many Chinese wearing the dress and skull caps that one would normally see in Baghdad or in other Islamic countries, but their association with this culture goes back centuries. Most likely this came about with the opening of the Silk Road and the trade between the countries along that route.

Xi'an has two main towers inside the city walls, one being the Drum Tower and the other the Bell Tower. We visited the Drum Tower after climbing some 60 steps to the first floor. There we found a row of huge drums along one side of the building and several other even bigger drums at one end. Inside the tower musicians were performing and one attractive girl danced with small drums attached around her body. She had one at her

## China Odyssey - Part 2

by June Sim VK4SJ

### Day 8 Xi'an on the Yellow River, Shaanx province, central China

Breakfast was a buffet style in the revolving restaurant on the 20th floor with good views of a very hazy Xi'an. We were then on the bus by 8.45 as our first stop was the Xi'an Foreign Language University for a lecture by Professor Yao, the subject being: An Outline of the Cultural History of China. Professor Yao was very interesting and she held our full attention for several hours. She later gave very frank answers to our questions about life after Chairman Mao and the Cultural Revolution. Prof Yao has traveled widely and had written several textbooks for use by her students in her lectures. Many of us purchased the book she wrote and used for our lecture, as it is quite informative and one I enjoyed reading. After the lecture, we had lunch in the teacher's dining room where we were treated to a dumpling-making demonstration. The dumplings were sticky dough filled with all sorts of minced up ingredients that was then steamed. We then all tried our hand at making dumplings, with many weirdly shaped results, causing much mirth from the onlookers.

Life for the resident students appeared very sparse. We were told that the female dormitory consisted of 2x3 metre rooms, communal toilets and showers, one toilet and shower per floor with no air-conditioning. The summer temperature often reached 40 degrees C. Water for each student was also restricted to two air pots of water a day for drinking, tea-making and hand-washing their clothes. Every spare moment is spent in study and we noticed students exercising with a textbook in one hand.

Our next stop was the Shaanxi Museum of History. This museum demonstrates Chinese history from the discovery of the Peking Man to modern times. The museum covers an area of 60,000 square metres, spread more than three floors, and contains some 370,000 pieces; about 2,700 of which are on display at one time. The museum also contains an extensive research area as well as a multifunction hall that provides six different language translations. This museum was formally opened on the 20th June 1991.

All exhibits were very interesting and they all had descriptive notes attached, giving the estimated age, where the exhibit was found and its use, whether ornamental for royalty or for everyday use. There were implements going back through the various Dynasties.

With the finding of the Entombed or Terracotta Warriors from the Qin Dynasty 259 – 210 BC in the Xi'an area in 1974, many of the treasures and figures plus bronze chariots and bronze horses have now ended up in this museum. An extensive area is devoted to the display of these treasures, including the figure of a kneeling archer, whose details are so precise and

clear that even the ridges of the exposed sole of the shoe can be seen clearly. We could have spent a lot more time in this museum but what we did see whetted our appetite to see the tombs of the Terracotta Army.

On the way back to the hotel, we made a side trip to a government-owned and run jade factory, where we were shown the various types of jade. We learnt that Jadite is the best quality and that jade comes in many colours; the more transparent the better the quality. Jade is almost as hard as diamonds, and will score glass with ease; a property that is one of the tests of good jade. Like many of these tours, we ended up in the showrooms where there were jade carvings and jewelry for sale. Some of the pieces were highly priced; I worked out the price of one pendant at around \$ 4000, a bit more than I was prepared to pay. However, I did purchase a jade ball within a ball within a ball, etc.; all carved from the one piece of jade. I bargained hard and long for that item and finally got it for what I thought was a good price.

After a quick shower and freshen-up we went back into the centre of Xi'an for a dumpling dinner. There were eighteen different dumpling dishes spread around the table, each person receiving about two. Most were delicious, even though the contents were not always identifiable.

#### **Day 9 Xi'an, Shaanx province**

The tour resumed at 8:45am, after a “revolving” breakfast on the 20th floor of the hotel. We then drove out to the Terracotta Warriors and Emperor Qin's Mausoleum site. This massive find was discovered in 1974 when some local farmers were drilling a series of wells in search of water. The drillings unearthed pottery fragments and ancient bronze weapons. The village head reported the find to the local government and they in turn contacted the National Cultural Relics Bureau.

The mausoleum and pits 1, 2 and 3 now cover an area of twenty hectares. Extensive landscaping and car parks surround the site. After work started on pit 1, and thousands of life size and larger than life size warriors were unearthed, pit 2 and pit 3 were discovered. Today, work is still going on, unearthing more figures. Finds have been made to the west of the original site, nearer Emperor Qin's Mausoleum. These finds included two sets of bronze chariots and horses.

Pit 1 is now housed in a huge dome-like structure 250 metres long by 65 metres wide. Photography is now allowed, but using flash for an exposure is forbidden. Around 6,000 warriors have been restored so far, with many more undergoing restoration. I kept hearing the words ‘mind boggling and amazing’ repeated by other visitors as we gazed in wonder at the row after row of life-size, lifelike figures, drawn up in formation and looking as if they were ready to spring into action. No two faces and hairstyles appeared to be the same, and the fine details of each figure were astounding. We



The Entombed Warriors in Pit 1, Qin Dynasty 259 – 210 BC  
The pit is 65 m wide and 250 m long.

spent a full half-day in this wonderful area and, all too soon, it was back to the bus and onto our lunch stop.

After lunch we returned to Xi'an and stopped at one of the watchtowers and city gates. Xi'an is a walled city with about 13 km of the wall having been restored. We climbed the 74 steps to the top of the wall and marveled at its size and thickness. The top of the wall is wide enough to take four to six chariots and horses side by side. These days the only traffic on the top of the wall is tourist, either walking or cycling around the top. A footrace has been staged on top of this wall. I took some photos of the top of the wall disappearing into the mist or smog - it was hard to tell the difference.

The evening's entertainment was an excellent floorshow by the Tang Dynasty Music and Dance Group. It was a fast-moving, well-produced show with fine musicians and acts, and the costumes and settings were beautiful.

#### **Day 10 Xi'an to Chongqing on the Yangtze River,**

An early start was the order of the day, so we were on the bus by 8:00 am, with the first stop at the Tang Dynasty Arts Museum. This museum contained many relics and murals recovered from tombs dating back 1,200 years ago, including pottery and artifacts from the Silk Road era. The Silk Road extended from China to the Middle East and was an important trade route and link with the Western World. This visit ended up in an art gallery