Spring 2013



The Newsletter of the Royal Gunpowder Mills Friends Association

Early Rocketry Part 3

**Early Years of Badminton** 

**Personal Notes** 

Air raid Shelters

**Eric Kendrew Images** 

Letters:

Another Flashpowder Snippet

**Obituary:** 

**Ray Williams** 



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Deadline for the next issue is 17th May 2013

# Chairman's Chat

This is being written during the Mills' open week 16 - 24th February held over local schools' half term. The weather could be much better but a good number of visitors have come so far.

Over the winter new exhibits are being prepared for the summer season. Please suggest any items that may be of interest to our visitors.

On 12th January Dave Sims and I took a stand to a Space Day at Droitwich Public Library. Our stand had several rocket motors which interested a lot of visitors. We also displayed a rocket seat ejector pack from a Harrier aircraft. One of the exhibitors was particularly interested in this as some years ago he had had to eject from a Buccaneer aircraft which must have been quite an experience. Other exhibitors showed model rockets, including one about 8ft long, astronomical telescopes and radio equipment.

I hope we will see a lot of Friends at the AGM and Social Gathering on Friday 17th May in the cafe.

# John Wright

PS. Brian Clements always welcomes new items for Touchpaper from Friends.

# Editorial

Thanks to our usual contributors we have another packed edition. For those of you receiving the e-mail edition I'm sorry that most of the images are not in colour, they are historical monochrome; those reading the printed version will not notice the lack of colour as we can never afford to print in colour.

Again we are short of letters; there must be someone out there with something to say. Are you happy with pages packed with text, would you prefer a more open layout, larger print, more or less images? Your opinions do matter to us. For many of you the only contact is via the newsletter so do send us some news.

The café and landtrain have been booked for our AGM and social event on the 17th May as announced in the last issue, with the price for lunch held at  $\pounds$ 8-00 as for last year. This is a good opportunity to meet old friends, make new ones or just come to support us or complain.

A booking form is enclosed with the printed version or included as a second attachment with the e-mail version, it would be helpful if you could return them as soon as possible so that we can make the best arrangements for catering. If you only come for the AGM tea, coffee and biscuits are provided at no cost, what better incentive to hear what we get up to!

Please do make an effort to come. If you are coming to the social event please try to arrive in time for the AGM.

# Brian Clements

## Early Rocketry and Rocket Propellant Part 3

#### America - The American Rocket Society From Wonder Stories to Reaction Motors

At a time when Robert Goddard had achieved his first successful launch from his new test site in New Mexico enthusiasts in New York inaugurated a rocket study group with the title the American Interplanetary Society. Their goal from the outset was to develop the rocket as a means of getting into space.

They met in the apartment of G.E.Pendray and the link which connected them was that all contributed stories to the magazine 'Wonder Stories'.

This highly unlikely group amply qualified for the description dreamers and theorists.

#### Publicity

With this background it is not surprising that the Society's first activities were in the realm of publicity. They agreed that only rockets could propel a space ship but their effort was directed not to any practical work but to writing numerous papers which were read out at Society meetings and circulated in duplicated form in what was initially called the 'Bulletin', later 'Astronautics', and in its final form much later 'Jet Propulsion'.

The Bulletin did begin to attract attention from the European rocketeers and the Society was jubilant when the Frenchman Esnaut-Pelterie sent it an autographed copy of his book 'L'Astronautique', (see Touchpaper Autumn 2012). The December 1930 Bulletin contained a letter from the German Interplanetary Society assuring America that it had 'not gone to sleep'. The Society's appetite for promotion was significantly whetted when Esnaut–Pelterie announced his intention to visit America. Without much hope of success the Society invited the rocket oracle to speak at a meeting to be arranged by the Society. To their surprise he accepted. The auditorium of the Museum of Natural History in New York was booked. This held 1500, but at its most optimistic the Society expected about half that. What transpired fully conveys the flavour of the early antics of this group of young idealists. When they arrived at the hall they were startled to find a crowd of about 2500 impatiently waiting to get in to see the film which had also been arranged. To their consternation this was followed almost immediately by a hand written note from the Frenchman that he had contracted a severe cold and was unable to attend. One can't help having the suspicion that he hadn't quite realised how amateurish the Americans were and when he did he felt it beneath his status to address their meeting. However they did have a copy of his speech and Pendray decided to press on and read it out, to not one but two 'performances'.

Somehow the audience got hold of the idea that Pendray was in fact the Frenchman and at the end of the speech there was a surge eagerly seeking his autograph. Pendray decided to continue the illusion and blithely signed with the Frenchman's name and so many went out into the night happy in the thought that the programmes they were clutching had been autographed by a famous person.

#### The first seeds of practicality

In 1931 Pendray and his wife decided to visit Europe. They were particularly impressed by the German Interplanetary Society (see forthcoming Early Rocketry Part 4) and their small liquid fuelled motor. The scene was therefore set for a move however tentative into practical rocket building and as can happen the person to do it was there – Hugh Franklin Pierce. Although he had taken a desk job connected with the New York subway system, Pierce was an eminently practical man, having served as a mechanic in the US Navy in WW1, and constructed mechanical objects as a hobby. He was therefore strongly attracted to the Society and announced that he was willing to devote his entire resources to building a rocket, including finding a suitable workshop. Pendray appears to have had the ability to formulate a design.

By this time the Society had contacted Goddard for advice. It wasn't forthcoming. He had expended a considerable effort to get to New Mexico and it was perhaps rather naïve to expect him to hand over all the fruits of his labours.

Despite this by February 1932 Pierce had succeeded in producing the Society's first rocket.

To reflect this the Society was renamed the American Rocket Society.

#### **American Rocket Society Rocket No.1**

The motor was first tested at New York University and the resultant modifications took up to November 1932, when the intrepid experimenters assembled on a freezing cold day at a farm near Stockton, New Jersey, about 100 miles from New York.

Previously a small group had dug a sand bagged observation trench and a launching rack – two 15ft. timber uprights.

The rocket was liquid fuelled – liquid oxygen (lox) and petrol with electrically actuated valves. A nice touch of domesticity was provided by Mrs. Pendray who had stitched the rocket's parachute.

The idea was first to establish the thrust with a tethered test. The test was successful. A thrust of 60 pounds was indicated – equivalent to an altitude of about 19,000 feet.



G.E.Pendray. Mrs. Pendray and Franklin Pierce at preparation of Rocket No.1 for static test



Rocket No.1 Static Test

The next test was to determine whether the rocket would actually take off and fly in a coherent course, i.e. straight up. At this point the trouble started. The rocket would not move freely in its timber guides. In the effort to free it it fell to the ground and was irretrievably damaged - so ended Rocket No.1.

However most of the components were undamaged and were taken back for reassembly within a strengthened casing.

#### ARS Rocket No.2

Designations had now been abbreviated to ARS. An important modification concerned valve operation. Electrical actuation had given some trouble so this was substituted by the simple expedient of opening the valve by pulling on a cord from the operating dugout.

On 14th. May 1933 the test party assembled in Marine Park on Staten Island in New York Harbour.

Twenty five feet from the launch rack was a dugout for three men - the fuel lighter, the valve man and an assistant. Actual observers were further back at 95 feet.

As before the fuel was petrol and the oxidant lox. The petrol was forced by nitrogen under pressure in the petrol tank.

First the fuel was ignited by the fuel man with a torch applied to the wick, who then 'retired' i.e. ran for cover.

As soon as he was in the dugout the valve man pulled the cord. The motor blazed into life – for only eight seconds before expiring.

Undeterred the experimenters decided to make a second attempt.

#### Do not attempt this at home.

Again the wick was ignited and again the valve cord was pulled. But no flame, the handle had fallen off the valve. Before anyone could say anything Smith the valve man leaped out of the dugout, ran to the rocket, containing an oxygen tank which might explode at any moment, replaced the handle and just before jumping back in pulled the valve cord.



#### Rocket No.2 First liquid fuel rocket fired by the American Rocket Society On left - Valve man Bernard Smith running for safety after very dangerous release of valve

This time the motor roared into life. But the rocket reached only 250 feet before the oxygen tank gave way and exploded and the rocket fell into the water, to be retrieved by two excited small boys who had witnessed the proceedings from a rowing boat despite being warned away.

However the Society had achieved flight. Its cash reserves now amounted to four dollars and twenty cents. But importantly it was beginning to attract vital trained engineers and technicians and a properly constituted technical committee was formed.

The dreams begin to turn into reality

One outstanding recruit was John Shesta, the son of a Russian who had originally come to America as a purchasing agent for the Czarist government. Shesta was later to become a bright star in the American rocket firmament. He had been fascinated by rockets since boyhood and had constructed his own powder fuelled examples (independently he had arrived at the conclusion that the powder should be wetted - first originated by Congreve).



Entire staff of Reaction Motors in 1943

# 3rd.,4th.,5th., from left James Wyld, John Shesta, Franklin Pierce

#### ARS Rocket No. 4

Shesta and a small team was charged with designing Rocket No.4. No.3 was allotted to a team led by Pendray and including Smith, the valve man who had risked his neck on Rocket 2.

Shesta's was ready first. Beautifully constructed and robust it was seven feet long and three inches in diameter. There was a single combustion chamber with four highly polished brass nozzles which would throw the blast clear of the tanks. On 9th. September 1934 again at Marine Park the rocket was fired. At first it climbed several hundred feet vertically then two of the nozzles burned out. Its flight flattened but it continued on the remaining two nozzles, before dipping downwards into the bay, having been aloft for fifteen seconds.

It had risen almost four hundred feet and travelled four times that horizontally, reaching a speed of at one point about 700 miles per hour.

It is a measure of the Society's progress that this speed was achieved six months before Goddard reached this point.

#### Ten years of development

It was apparent that the days of firing off rockets merely in the hope that they would stay aloft were over. What was now needed was a coherent research and development programme to identify all areas which needed further study within a coherent programme of scientific investigation and experiment.

Two of the most important areas were to develop a dependable motor and to develop an efficient test stand which could withstand the conditions which would arise with more powerful motors and which would permit better study under increasingly demanding operating conditions.

John Shesta took on the test stand. In this he was assisted by another rising star in the firmament – James H. Wyld. This partnership was later to have important implications for the American rocket industry.

What resulted was a stand of great strength with a full complement of gauges for measurement of fuel combustion, combustion chamber pressure, temperature and motor thrust. All had a large face to enable sight at a distance. There was an extremely accurate timing clock and a second by second camera.



John Shesta's test stand



Test stand in use in 1935. John Shesta standing pulling valve cord

In the meantime a momentous event for the Society took place. Thoughts of space were ever present and in 1936 another of the Society's stars Alfred Africano, working from the Society's experimental data, designed a high altitude rocket which won the REP-Hirsch prize awarded by the French Astronomical Society.

However the Society's main effort was still directed towards the lower altitudes – i.e. study of the weather by sounding rockets as they were termed. The American Weather Bureau had been using upper air balloons for this purpose. They had significant disadvantages – liable to drift, loss of instruments, slow rise preventing quick observations. The alternative, aeroplanes, was unsatisfactory – expensive and limited by adverse weather, the very time when observation was most required. A rocket, if it could be made dependable, would not have any of these disadvantages.

To meet the challenge the Society formed a new Technical Committee with sub-committees to study the whole spectrum of rocketry science – the motor, the shape of the rocket, launch devices, the parachute, the instruments, controls and so on. By this time they had attracted an impressive array of enthusiasts, many with science or engineering qualifications, who were able to provide the necessary expertise for the committees.

James Wyld made the motor his speciality. At twenty six years old he ultimately produced a motor of outstanding quality. It reflected all the desirable characteristics of good engineering – simplicity of design, inherent lightness, practicality and economy of manufacture. Of paramount importance was the cooling system. The motor was cooled by incoming fuel. The idea was not new but Wyld refined it to a level not previously achieved. Again the design was simple but effective – the combustion chamber was one small tube fitted inside a larger tube with a space of one eigth inch between the two walls. The incoming fuel swirled through this space, absorbing much of the heat from the combustion chamber, before entering the combustion chamber inlet nozzle. The motor was thus cooled and at the same time high efficiency was achieved by the pre-heated fuel. By this time -1941 ethyl alcohol had replaced petrol as fuel with liquid oxygen continuing as oxidant.

Astronautics reported 'A reliable motor for astrological sounding rockets has at last been designed, built and tested'.

By this time war was intervening. The US Navy offered Wylde 5000 dollars for the motor design and a six month development contract for the production of a series of experimental motors ranging from 100 to 1000 pound thrust. The team consisted of Wylde, Shesta, Hugh Pierce who had laboured faithfully since the early days and a new man Lovell Lawrence reflecting the growing influence of electronics on controls.

#### **Reaction Motors**

A week after Pearl Harbour, using the Navy's 5000 dollars as capital, one of the world's first rocket production companies was formed – Reaction Motors, Incorporated

The Navy's particular interest was assisted take off and the liquid fuel RM motors performed perfectly in tests. Ultimately the medium adopted was the JATO dry fuelled unit, but the RM test results were of significant benefit in their development.

Reaction Motors went on to achieve impressive firsts. In 1946 it built a four motor unit with a thrust of 6000 pounds which powered the Bell Aircraft X-1 faster than the speed of sound. The same engine type drove a Douglas Skyrocket plane sixteen miles into the stratosphere with the pilot streaking through space at twice the speed of sound. RM powered the Navy's Viking when it ascended 150 miles.

But as often happened the pioneers were uncomfortable working in what had been become an administrative capacity in an expanding corporate entity increasingly dominated by production men. The first to leave was Franklin Pierce who sold his shares and disappeared from the scene. The company reached the stage of requiring a fresh capital injection and was bought into by the Rockefeller interests. Reorganisation followed and Lawrence departed.

Wyld was seconded for a time to the Atomic Energy Commission at Oak Ridge where he was happy doing what he did best, solving new problems in a research atmosphere. Shesta had remained at Reaction Motors as Chief Engineer, but he finally decided the new set up was not for him and resigned.

Wyld returned from Oak Ridge, the last of the four. He had decided to resign when tragically he died, in 1953 aged forty one.

With James Wyld's death American rocketry lost one of its brightest stars.

One wonders whether amongst personal effects somewhere there is still a faded programme from a 1930's meeting bearing a signature which the owner fondly believes is of the rocket oracle Esnaut-Pelterie.

Les Tucker.

### **Puns for Laughter**

1. The fattest knight at King Arthur's round table was Sir Cumference. He acquired his size from too much pi.

2. I thought I saw an eye-doctor on an Alaskan island, but it turned out to be an optical Aleutian.

3. She was only a whisky-maker, but he loved her still.

4. A rubber-band pistol was confiscated from an algebra class, because it was a weapon of math disruption.

5. No matter how much you push the envelope, it'll still be stationery.

6. A dog gave birth to puppies near the road and was cited for littering.

7. A grenade thrown into a kitchen in France would result in Linoleum Blownapart.

8. Two silk worms had a race. They ended up in a tie.

9. A hole has been found in the nudist camp wall. The police are looking into it.

10. Time flies like an arrow. Fruit flies like a banana.

11. Atheism is a non-prophet organization.

12. Two hats were hanging on a hat rack in the hallway. One hat said to the other: 'You stay here; I'll go on a head.'

13. I wondered why the baseball kept getting bigger. Then it hit me.

### **Badminton 1947 ish**

Having read Bryan Howard's account on badminton in the 60's I was encouraged to recall my time of playing at Hoppit Hall.

My Dad worked on South Site and we lived in a flat in Sandhurst Hospital annexe, so it was very easy for us to join the Club.

There were two courts and they were both used on Club nights, but how many members there were I have no idea.

The people I do remember were Doc Pryde, who was the best player in the club and who taught me to play, Geoff and Pam Colley and a friend of theirs whose face I recall but not the name. There was Tich Lermit, Hans Ziebland and various outsiders like Johnny Payne (Payne's nurseries) Dolly Green (later his wife), Joyce Green – Dolly's sister, and various others.

We played quite a few matches, one I recall was against BOC at Edmonton, remembered mostly because we all travelled in Doc Pryde's car and the gear stick came away in his hand every time he changed gear!

We also had a notable match, Owens v. RGPF, I don't remember the result but it was great fun. Our team was my Mum, Dad, my brother Peter and his wife Sylvia, myself and brother Paddy. My Mum and Dad were very infrequent players, but the rest of us played often.

The courts were very good and well situated with a very high ceiling and were always a popular venue for visiting teams, although how we got them through the gates I cannot recall, but I think the police on the Bridge gate let them in through both gates and saw them out afterwards.

It was always a very sociable evening and afterwards would often adjoin to the Social Club for drinks and Billiards, happy times. I don't know when the Club moved out because by 1952 I had run away to sea!

Sheilagh Owens

"A man would do nothing if he waited until he could do it so well that no one would find fault with what he has done."

Cardinal Newman

Quote in I L Finar's 'Organic Chemistry' Volume One

From Bryan Howard

A common mistake that people make when trying to design something completely foolproof is to underestimate the ingenuity of complete fools.

From Mostly Harmless by Douglas Adams

# Personal

We are delighted to announce the impending wedding anniversary of Bob and Margaret Brown on May 26th. Floral tributes may be sent to 38 Preston Park, Faversham, Kent.

Diane Howse received a letter from Allen Clark's stepson Trevor announcing Allen's death on May 7th 2012. He will be remembered by many on the Monkswood estate and although he emigrated to Australia on retirement he still kept in touch with Waltham Abbey friends.

The surprise death of Maureen Gaughan occurred on 31st December in Beccles where she was found peacefully 'asleep' by friends. I saw her in Lowerstoft in the autumn and she was as 'chipper' as usual. She was 76 in November.

Alan and Marjorie Short celebrated their Diamond wedding anniversary on December 15th.

Bryan Howard.

James Helyer's son Nigel informed us that his father died on 26th January.

Some sad news for anyone who remembers volunteer Alan Read, he passed away in hospital on the 30th January 2013.

The editor will be pleased to receive any news of the birth of grandchildren etc as the reporting of deaths is depressing. Get in touch by e-mail, text etc or by putting pen to paper.

# Letters to Touchpaper

#### Another flash powder snippet

Further to the letter to the Winter 2012 Touchpaper on flash powder and the article on Robert Goddard and early rocketry, although Goddard was normally careful not to over speculate on the possibilities of his rocket he did include in his 1918 report some theoretical calculations demonstrating that a rocket could be designed that might attain a velocity high enough to escape the earth's gravity and 'fall on to the moon'.

He wrote that if the rocket contained a relatively small pay load of magnesium powder, it would make a bright enough flash, when it struck the moon, to be visible from the earth through telescopes.

Les Tucker

### The Air Raid Shelter

Minnie Fenton's article on W.W.1 Gotha G.V. Bomber Aircraft informed us that in the morning of the 7th July 1917 a formation of Gotha's flew over Waltham Abbey. There were also two Zeppelin Airship raids over W/Abbey in April 1916 and October 1917.Minnie also states that there were 'no casualties'. The W.W.1 air raid shelter in W/Abbey can be found near the 'Rose Garden' bordering the 'moat'.



The shelter is 10' by 8' and made with unreinforced (shuttered) concrete. The front was further enforced by concrete blocks. The height is 4' and slopes upwards to 5'. The structure is enclosed in a man made earth coat. Interesting feature is a 5'' girth flue with pipes going to the outer surface. The roof is reinforced concrete.

Hence 'no casualties'

In fact, aerial raids by Gotha G.V Bomber's killed 857 people (2,908 casualties) mainly over London.

Plot X1: - W.W.2 semi circular, unreinforced concrete shelter, shuttered built, using corrugated galvanised iron (CGI) as a 'centre frame', the string course showing the 'aggregate' material. CGI plate at one end with doorway and ramshackle porch. Built in the fashion of the 'Anderson Shelter' with gullies to stop rain water seeping into shelter. Complete with working siren.



Close by, Plot 104:- Hydraulic Gunpowder Press 1850's with early use of a CGI roof. CGI was invented in the 1820s in Britain, by Henry Palmer. It was originally made from wrought iron, later steel. Plot 107:- massive 'E' shaped concrete blast wall..

The marks of timber shuttering of the unreinforced concrete can clearly be seen.



Plots ARS2 and L150:- W.W.2 air raid shelters, rendered, with two entries, built to withstand lively bangs.



No cellar as built over the River Lea's floodplain. They were made by pouring cement into timber shutter moulds ('formwork'), which set into unreinforced concrete blocks, capped with a reinforced concrete roof (good for tension) 9" thick.

Ray Stelzner

## Eric Kendrew / Images

David Manners in his obituary for Eric Kendrew, Touchpaper Autumn 2012, and later Jim Hawkins in his letter, Touchpaper Winter 2012, wrote of Eric's work on Beckman & Whitley high speed cameras at the New Hill firing point and on the underwater explosives testing facility at Newton's Pool.

The Archive Image Collection has images of Eric both with camera and at Newton's Pool. In addition Jim's letter mentioned the spectacular detonation plumes at the Pool.

#### Waltham Abbey Image Collection / Enquiries

At the time of closure a collection of documents and images within them, entitled the Waltham Abbey Special Collection (WASC), was left.

This and the rest of the Archive gradually fell into disarray as various parties accessed it without any formal control and since the reopening in 2001 there has been a considerable effort in recataloguing and adding to the Archive, including the all important digitisation. Included in this was the decision to form a separate image collection entitled Waltham Abbey Image Collection (WAI), including those already within WASC, and a considerable number of new acquisitions.

The work of digitising the image collection is now substantially complete and the main Archive documents well under way. In addition a digital index of all issues of Touchpaper has been created and all issues of the newsletters of the Gunpowder and Explosives History Group are available digitally.

There is a key word search facility for all of these, which has proved invaluable, and enquiries - Archive / image / historical, family or technical are always welcome:

E-mail: archives@royalgunpowdermills.com

Les Tucker



1. Newton's Pool in 1897 looking north to the sluice before later widening for test facility. (WASC 1655 / 11)



2. Eric at Newton's Pool 25-4-1968 (WAI 1010 / 19)



3. Eric with high speed camera ( WAI 1154 / 1 )



 Beckman & Whitley 339B streak high speed camera at N.Site Firing Point No. 2. (WASC 1518 / 1) (operator not so far identified. If anyone can do this please e mail Editor).

In the September 2001 Touchpaper Allen Clark wrote from Australia

"With the June issue more memories of Newton's Pool as I designed the suspension rig. I still have a coloured photo of a charge going off Occasionally I would stand at the edge of the pool when the charge was fired, the ground shaking under my feet.

Locally I am often reminded of RO and an old colleague Dr. Sims as I pass some holiday units called 'The Simbo Flats'".



5. Plume at Newton's Pool 1968 . Allen Clarke on right. (WASC 1126 / 7 )

Health & Safety where wert thou.

# Obituary

Dr Raymond Lloyd Williams CBE CChem FRSC

1927 - 19 November 2012

The February issue of Royal Society of Chemistry News reported that Ray Williams died on 19 November 2012.

Ray came to ERDE in 1953 or1954 to work with Lionel Bellamy, initially on infrared, and later also on nuclear magnetic resonance spectroscopy. Sometime during the period 1959 - 1961 he became Superintendant of Analytical Services and stayed there until probably the early seventies when he became Director of the Metropolitan Police Forensic Science Laboratory. He remained in that post until his retirement.

During his time at ERDE he stayed in digs during the week and travelled home to Bournemouth at weekends. On moving to the Forensic Science Lab he travelled daily from Bournemouth and managed to arrange a police car to take him from the station to the Lab.

He played tennis throughout his career and afterwards. During his retirement he developed angina for which, ironically, he took nitroglycerine pills in order to continue playing.

John Wright

# **Guidelines for submission of copy**

As a guide approximately 400 words fit a single A5 page without illustrations, it generally helps to include a separate image to break up the text, so if you have an image(s) please include it(them) although we may be able to find something.

Text may be sent as emails or attached to emails as plain text or Word documents. Pictures should be sent as separate images, either jpg or png although other formats may be useable. If images are included in Word documents more effort is required to separate them and there is a reduction in quality so please send images separately if possible. Paper originals should be scanned at 300dpi, digital photos can be resized to 1200 x 900 or larger, full size pictures from modern cameras are bigger than necessary and waste time uploading and downloading.

Pictures should be in colour if possible, they may only appear as grey scale in print but this is to keep costs down, normally they will be in colour in the electronic version.

We are happy to receive paper copies of text and pictures but cannot guarantee their return, if you cannot send items by email consider bringing them into the Mills or passing them to someone who does come in or can email them

Finally please be sensitive to copyright rules.

#### Events at the Royal Gunpowder Mills

For information visit the Web Site:

http://www.royalgunpowdermills.com/whats-on-and-events/



Water Warden's cottage



Snowdrops in the cottage garden January 2005

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