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Home this Afternoon BBC Radio 416th January, 1968Polly Elwes:

Well, as we have got rather a shorter programme than usual, we have postponed two items you may have noted in the Radio Times so we are beginning with Derek Parker. If you have ever stood and admired Waltham Abbey in Essex and wondered about its 900 year old history set in peaceful, rural England you might be surprised to discover a few hundred yards away a piece of countryside that is anything but peaceful. A corner of Britain that has in fact been vitally concerned with our defence for over 400 years. Derek Parker went there recently.

Derek Parker:

Really if you were set down in the middle of the Explosives Research and Development Establishment all unawares, you would never guess you were anywhere at all concerned with scientific development. There is the occasional muffled bang in the distance to be sure, but the countryside itself looks so peaceful and quiet. The ruins of some old buildings peep out here and there from the undergrowth and there is a network of canals with the dark water lying still and an occasional fisherman dropping a line down into it. The first hint of the Establishment's concern with big bangs comes as you turn off the main road into Powdermill Lane, an ancient name which underlines the place's preoccupation with gunpowder. The preoccupation that, as the Librarian, Mr. Malcolm McLaren, told me, dates back for over four centuries.

M. McLaren:

The first positive link between Waltham Abbey and gunpowder is contained in the state papers of 1561 in the form of a letter to John Tamworth of Waltham Abbey concerning the supply of saltpetre and sulphur. The importance of the local manufacture was emphasised a century later by the Rev. Thomas Fuller who wrote that there was more gunpowder made by the mills in his parish than in all England besides. Unfortunately powder making was a hazardous occupation and the parish registers for 1665 record the burials of two workmen killed by a mill explosion.

The mills then passed into the possession of the Walton family, in whose hands they remained for over a century until they were bought by the Government in 1787. The man who played the greatest part in this was General Sir William Congreve, who disputed the widely held belief that the private manufacturers made better and cheaper gunpowder than the Government. Later Congreve was able to demonstrate convincingly the superiority of the powder from the Royal Gunpowder Factory and still show savings of some £50,000. The quality of Waltham Abbey powder was recognised overseas and both sides in the American Civil War drew on the experience and expertise of the factory. The United States Ordnance Manual for 1862 records that "no-one makes better powder than the British".

D. Parker:

Gunpowder seems far off and curiously innocent now, but during the second half of the 19th century new explosive materials were developed at Waltham Abbey. Guncotton and nitroglycerine, and then came cordite and tetryl, TNT

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and RDX. Now RDX, Mr. McLaren tells me, is Research Department Explosive, which was of enormous importance during the first years of the second world war when the Royal Gunpowder Factory, as the Establishment was still called then, was the only place in the country making it. It was in 1945 that the Royal Gunpowder Factory lost its name, rather a pity that, and became the Explosives Research and Development Establishment which now comes under the Ministry of Technology. Though it still has the big bang as an element of its work, the Establishment does other things too and to find out about the scope of its activities I went to see the Director, Dr. L.J. Bellamy, who I found sitting in his office beneath the traditional scientist's blackboard on which were the remains of what looked like complicated and highly secret equations for which the enemy's secret service would give their eye teeth. I dare say they were quite innocent really. But Dr. Bellamy told me that the making of explosives was no longer the main work at Waltham.

Dr. Bellamy:

Still 50% of our work is propellant work for guided weapons, guns and for space activities, meteorological work, distress rockets, pilot ejector seats, and it is surprising how much of propellantry nowadays is not directly military but is more space, meteorological and rescue work, coastguard rockets and this kind of thing and this is about still 50% of our total needs. The important thing here is not just that you meet the requirements of the designer but that you stay meeting them for 10 or 20 years if you can. These are unstable materials. You hope you are never going to use them on the military side and if you do they have got to work. You don't buy a motor car and put it in the garage for 10 years and then push the button and hope it will start. This is what you have to do with a propellant. I believe we have done more in this than most other countries and the tax payer doesn't have to replace his propellants here as often as he does in many other places in the world.

D. Parker:

Well, I suppose that is one comforting thought in the present financial situation. I wonder if the idea of the instant start might be applied to cars these cold and frosty mornings. That would be really useful. But the important research work which goes on at Waltham Abbey does have some amusing by-products, though Dr. Bellamy was a little shy of talking about them. While working on very elastic material for use with propellants under very low temperatures for instance, the scientists came up with a material that, if you made it up into a ball and threw it, it would give you 98% of bounce. So you could drop it and it would come back virtually into your hand again. But the Establishment isn't in the children's toy business and the high bouncing ball that you may have seen children bouncing over their houses is being made elsewhere.

At the moment there is a lot of work on the strengthening of light metals. They have discovered a kind of fibre that, if it is grown in tiny strands, which they call whiskers, has something like 100% more strength than ordinary material and these are used in the development of lighter aircraft engines and that kind of thing.

And there is something called an ear defender which no doubt comes in useful when the Establishment is experimenting with sonic booms.

Dr. Bellamy:

We have a problem that if people are working on explosives we can protect them from the hazards of the thing going off and we don't allow them to work under conditions when they might be killed. On the other hand we can't protect

/them .....



them from the possibility of a fair amount of noise which would deafen them and for such people we have developed a simple ear phone which enables them to hear ordinary noise at ordinary levels but which automatically reduces any loud noise to a perfectly tolerable, reasonable level. These are now going to find, I believe, great application in the services and perhaps air fields and other places where there are occasional loud noises which would be otherwise bad for the hearers.

D. Parker:

Talking about loud noises, you make the work here sound very innocent indeed but you do in fact still make bit bangs presumably. How safe is this in an establishment of this kind? I am not entirely free from being nervous, I must say, at sitting in the middle of it all.

Dr. Bellamy:

Very safe indeed. Our accident rate is a good deal better than the average chemical industry. The main thing about explosives is that you have got to be scared of them. As long as you are you take the proper precautions and you remain safe. It is also not generally realised that a military explosive has to be extraordinarily safe. It has to be carried round in lorries, perhaps dropped off the tailboard. Most weapons are tested by dropping from 6 ft. onto concrete. It has to be this kind of safety and this is why you won't find any more powerful conventional explosives than we now have because if you make them more powerful you also make them more dangerous and entirely unsuitable for general use.

D. Parker:

Dr. Bellamy, it is all very well to talk about dropping explosives quite safely off the back of a truck but I can't help feeling that at some stage of the proceedings you must be dealing with very dangerous ingredients.

Dr. Bellamy:

This is true. Even in dynamite the nitroglycerine itself is extremely dangerous but once compounded, dynamite becomes quite safe. Here we have developed a remote facility for producing explosives containing particularly dangerous ingredients which will enable us to manufacture the ingredients, mix them, blend them and machine them even, and finally put them into filled containers and fire them, all from a remote distance, the various pieces being transported by a very elaborate electrical railway system, which would be a child's dream and delight.

D. Parker:

One of the things that I dislike most in life is bigger and bigger bangs and I was going to ask you whether in fact you thought that we had reached the end of the big bang - whether in fact we have gone as far as we can go.

Dr. Bellamy:

With the big bangs it is really a question of how big a charge you have, but insofar as the explosive itself goes you can show on the back of an envelope that you have just about reached the end of the road. If you want to go for more power you will bring in so much more danger that it isn't worthwhile.

/D. Parker .....

D. Parker:

I must say I am delighted to hear it and I suppose one result of this fact is that security at this Establishment isn't what it might have been a while ago. I don't mean, of course, that it is lax. There is still a system of passes and warrants and I doubt if you would be smiled at if you tried to get in under the wire, but the Establishment, as Dr. Bellamy explained, isn't absolutely top secret any more.

Dr. Bellamy:

We are not really a very secret Establishment any more. We published 75 papers in Scientific Journals last year and we have had a number of books from people in the Establishment.

D. Parker:

And what about your contacts with civil scientists for instance?

Dr. Bellamy:

Here we are trying to increase this. We would like to feel that we could assist all our local chemical industry by making available to them the very special physical tools for chemistry which we have here. Spectrometers and mass-spectrometers and nuclear resonance machines and we are indeed proposing to make these available to industry at cost, and we are publishing a little book laying out all the things we can do and all the services which we can offer at the prices which we shall charge and this will be going out to the local firms in the next few weeks.

D. Parker:

I suppose there is also a great deal of specialised work going on here which means that you must have men in the Establishment who know more in their particular field than perhaps anyone else in the country.

Dr. Bellamy:

Yes, this is true. In some areas such as the nitroglycerine, for example, I have already said we don't expect to make any major advances in this area but the country, as this is the main centre, does have to have at least one man who knows something about this in case an accident ever happens or some real troubles arise and, therefore, a man does what we would describe as good chemical research in this area, primarily to remain our one knowledgeable expert in the field and this sort of work is not done at the universities and of course is published and is good sound scientific work.

D. Parker:

So, if you get a parcel through the post one morning marked 'nitroglycerine - with care', you will know who to ring up about it. But seriously, there is obviously a great deal of work going on at Waltham Abbey which not only would be vital in case, which God forbid, we ever got entangled in another war, but which is proving every day more vital in the outside worlds of business. Soon there will be a museum set up at Waltham Abbey which it is hoped will be open to the public on occasions and which will contain some of the relics of the four centuries of work at what was at first the Royal Gunpowder Factory and is now the Explosives Research and Development Establishment.

Polly Elwes: After Derek Parker's report we change the subject.