Quekett Journal of Microscopy, 1995, **37**, 353-360

A history of Northern Biological Supplies (NBS)

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Summary

The history of a small but well-known firm of suppliers to amateur and other microscopists is outlined, from its beginnings as a schoolboy enterprise in the nineteen twenties to today. A particular feature is the discussion of its network of agents and suppliers over the years, which may be of significance in the wider history of microscopical firms. A guide to the dating of NBS microscopical preparations is included.

Early days, and The Heaton Rabbitry

BORN in 1914, perhaps an inauspicious year for long life expectancy, in the city of Bradford, perhaps not an immediately obvious rural area, I nonetheless developed an intense interest in pond and stream life, and by the time I left primary school I had made a large collection of named pressed wild plants, and could identify the water animals of the area.

At Belle Vue Grammar School I included chemistry and physics in my studies, but there were no courses in biology in those days. However, at thirteen I was given a pair of pink-eyed White Beveren rabbits; I bred them and exhibited them, winning classes locally and nationally. I was soon selling them as pets in the Open Air Market, and supplying them to biology departments of schools and colleges, and also to hospitals for pregnancy testing. They were kept on a plot of land rented from Listers of Bradford, part of it used as a vegetable garden and the other for 'The Heaton Rabbitry'.

On leaving school I was apprenticed for three years to Harrison Parkinson & Co., who were pharmacists, and also supplied chemicals and scientific apparatus to local hospitals, schools, colleges, and industrial laboratories. On four evenings a week I attended Bradford Technical College for Intermediate BPharm courses in chemistry, physics, botany, and zoology. During the summer, the botany and zoology courses included evening field study visits to local areas of ecological interest. Both John Carter and myself were introduced to microscopy and field studies by Malins Smith, the algologist and botany lecturer, and Dr Ritchie, the zoology lecturer. My lifelong interest in freshwater algae developed from Malins Smith's encouragement of my collecting and examining living algae. I will never forget the first time I saw zoospores being released from cells in a filament of *Ulothrix*, collected from a waterfall in the botanic gardens in Manningham Park in Bradford. I had just bought my first microscope, French, with a 10× eyepiece and a 10× objective.

L. C. Clark, who made fluid mounts and mounts of blowfly tongues for W. Watson and Sons Ltd., lived in Bradford, and some of his mounts were also sold over the counter at Harrison Parkinsons; this was my first contact with prepared slides. I often visited Clark at his home, and although he never showed me how to make mounts, it was an experience which did affect me later in life. John Carter and myself, as amateur microscopists, prepared a wide range of mounts, with special attention to freshwater life. We collected extensively in the Yorkshire Dales, using a tandem as transport. John, because of his contact with Dingley Fuge, who lived locally, began to concentrate on diatoms, whilst I concerned myself with a wide range of microtechniques.

At the end of my apprenticeship, the country was in a deep recession so I extended the range of our supplies to include living freshwater material, building a hut for this purpose. I collected from the many ponds in the Bradford area; as an example, crayfish were collected from a pond in a local park early in the morning, using meat on a string onto which the crayfish held. The frogs collected were put into an enclosed grass area with a bath sunk into it; they survived well, and the water sometimes became pea-green with *Chlamydomonas*, which I preserved with its natural colour — some has lasted to this day! There was a steady demand for living material from colleges and schools in the locality, so I started to preserve some specimens, to supply when living material was not available. Some schools had small museum collections, which often included marine material, and when I discovered that the Marine Biological Association supplied well-preserved specimens, I began to mount these in glass museum jars. I actually patented a design of tube mount — the HR Tube Mount — but allowed

it to lapse during the war. The 3 × 1in. or 6 × 1in. tube stood in a wooden base, and could be removed for examining with a hand lens; the design was very suitable for early stages of frog development, but the highest standards of fixation and preservation were required before the specimens were mounted and sealed.

Rabbit skeletons and the skulls of dog, cat, and pig which I prepared myself were added to the list in 1933, when the firm was awarded the contract to supply West Riding County Council schools and colleges. Bingley Training College became a good customer, and the County Education Department held a summer school there each year at which I was invited to display in 1934 and 1935, and to explain the methods of preparation used.

During 1933 and 1934, as I visited schools delivering specimens, I came to decide that I wanted to teach, and in 1935 I started a two-year course at Leeds Training College, qualifying as a teacher in 1937. During the advanced biology course, which included a week at Austwick in the Yorkshire Dales, I was able to continue to develop my special interests. I carried out a field project on the effect of pH on the distribution of freshwater algae in the Leeds and Bradford areas, and found some evidence that pH did affect reproduction in *Vaucheria* and *Spirogyra*. I also used simple handcut sections to investigate the microscopical structure of two-year-old twigs, to produce a key for the identification of their trees. During these two years I was able to carry on the supply business, because as a mature student I was allowed to go home each Sunday. My first teaching post was at Thackley Open Air School, Bradford. This was in a wooded area on the outskirts of Bradford; pupils from the centre travelled there daily by bus, taking all their meals in the school. At the outbreak of war the school was closed, and I was put in charge of the Wartime Gardening Scheme for Bradford schools. During my time at Thackley the name of the firm was changed from The Heaton Rabbitry to Northern Biological Supplies.

After service with the Royal Ordnance Corps, I attended a REME course at Glasgow University, passing as an Armament Artificer (Wireless), and was posted to East Africa to prepare for service in Burma. This included two acclimatization periods of six months. The first was spent near Nairobi, and during the six months there I was able to spend weekends at the Museum, where I met Dr L. S. B. Leakey and his wife Mary, the anthropologists. I did some skeletal work on East African fishes, but more important to me was seeing the Leakeys at work on their site in the Rift Valley.

The second period was spent in Ceylon (as it was then called), near Colombo. David Burt was Professor of Zoology at the University, and when I became interested in the camouflage of tropical spiders he suggested that I contact Professor Hale Carpenter in Oxford, who encouraged me to continue and record my observations. After the end of the war in the Far East, I was able to take a leave of four weeks travelling through India to Colombo. I was there able to mount the spiders I had preserved, and to prepare two papers on the camouflage devices of tropical spiders, later published by the Zoological Society of London.

The contacts made during the war did much to give me the confidence necessary further to develop Northern Biological Supplies, while still continuing my career in education between 1946 and 1970.

A part-time interlude

When I returned from Burma in 1946, I decided that Northern Biological Supplies would specialise in the preparation of microslides, to be supplied direct to customers as well as through retail stockists. As whole- and part-mounts of insects and spiders had already proved popular, stocks of these were built up during 1946, and the firm had nine retail stockists by the end of that year (see Table 1). These outlets were visited regularly on Saturdays, to ensure that their stocks were kept up.

In 1947, Britex (Scientific Instruments) Ltd. of London introduced their Naturalist Microscope, and asked if we would supply them with sets of slides to be sold with these microscopes. We agreed, and initially supplied them in brown boxes with corrugated inserts. In the same year five wholesalers of optical equipment also contacted us, and by the end of that year our business philosophy had developed to be formulated as supplying microscopical preparations direct to customers, and through manufacturers, wholesalers, and retailers of microscopes. This increase in demand for our preparations meant that stocks of specimens had to be collected and preserved to be ready for

processing later. The family had a three week break in August each year, and from 1947 to 1953 we took these holidays on the sandy beaches of Spurn Point at the mouth of the Humber. This was good for a young family; I was a registered bird ringer, and some of the time was spent ringing the willow warblers and other birds moving along the point, and counting the starlings which roosted there. When we were not playing on the beach we collected insects and freshwater animals; at times the beach was covered with ladybirds and rove beetles moving along the coast or coming from the continent. From 1954 our holidays were taken in the Yorkshire Dales, North Wales, and often in the Lake District. On these walking holidays collections of freshwater algae were made, as well as of common insects, freshwater animals, and spiders. To fill the demand for stained botanical and zoological sections, we built up stocks of material embedded in wax to be cut as required.

It became evident from customers' requests that there was a demand for chemicals in small packs for the amateur worker, and these were introduced. The packaging of the sets of slides was made more attractive; the yellow box was introduced in 1950, although Britex sets were still put up in bright blue boxes. In 1952 we supplied sets to one microscope manufacturer, five wholesalers, and twenty one retailers, as well as direct to customers in the more remote areas.

All this work on the Company went on while I was a teacher. Between 1946 and 1953 I was science master at Drummond Secondary School in Bradford, and secretary of the Bradford Microscopical Society, which met in the school laboratory. Many pupils came from slum areas of Bradford, and one aim of the science scheme was to interest them in animals and plants. Some of the plant studies were included in the school gardening scheme, and the animals were studied in the laboratory. This housed many large and small aquaria, and in the first week of the autumn term these were filled with sea water and animals from the Plymouth laboratory. After Christmas the local tropical fish society stocked heated aquaria with tropical fish, and in spring they were filled with freshwater animals; the local anglers organised a Saturday session in the river Aire. The identification of the insects was a problem at first, but I designed wallcharts to help, and these were later developed into the School Natural Science Union keys.

In 1953 I was appointed Rural Science Adviser to East Suffolk County Education Department, a position I held until 1970. During that time I was secretary for the annual meetings of the country's rural science advisers, as well as beginning the Practical Microscopy Courses at Belstead House. In 1964 I was seconded part-time as Team Leader of Theme One of the Nuffield Secondary Science Project, and a member of the Schools Council Working Party on Rural Studies.

For Northern Biological Supplies, the period 1953 to 1970 was one of gradual development. The range of microscopical preparations, chemicals, and apparatus was slowly increased as a direct response to consumer demand, and it gradually became evident that if the company was to develop to a fuller potential, it would have to become a full-time occupation for me. In 1970, when changes in local government were being considered, I retired from my post, but continued with adult education courses such as those in practical microscopy.

Full-time at last

1970 was also the year I was elected an Honorary Member of the Quekett Microscopical Club, and after sixteen years of practical microscopy courses at Belstead House, attended by a wide range of amateur and professional workers including Quekett and Postal Microscopical Society members, I had realised that many techniques had been lost in the past, and others would be in the future. I felt that some techniques such as fluid and dry mounts, and those of whole arthropods, should be further researched, replacing old natural products by new synthetic ones, on account of the necessity of providing materials more suitable for use in the home.

I decided that development should be carried out by NBS, trialled at future practical courses, and then published in small booklet form, to be widely available for amateur and other workers. There were, of course, financial risks involved in giving up a good job at age 55, but this was necessary if the work outlined above was to proceed; in fact, such risks did not materialise, even in the recessions we have experienced more than once. The work began in 1971, and took ten years to complete, when the eighteen separate booklets already published separately were then published together in one volume, *NBS Practical Microscopy*.

My earlier experience in pharmaceutical techniques and in preparing and mounting specimens helped in the development of new products. New fixatives for use in the field were developed, as living material cannot always be transported home. They were *Algal Colour Fixatives I* and *II* and *Freshwater Plankton Fixative*, all intended to be used with plastic tubes three quarters filled with the specimens and water, topped up with the fixative. Cements used in the past for fluid mounts were often no longer available, and by 1972 I had solved most of the problems of developing new ones. The cements were used with a ringing turntable, and did not go brittle, had good contact with glass, and were hard when dry. Development continued, and in 1983 other materials were introduced to go with *Bioseal I* and *Clearseal I* — *Bioseal II* as a protective cement and zinc white as another. In 1967 a range of *Dryseal* cements was introduced for making dry mounts, and described in Booklet Thirteen; in 1985 modified procedures were introduced using only three cements.

A number of mountants was developed, some for special purposes and others to reduce the chemicals needed in mounting. A water-white glycerine jelly was introduced for animal hairs, and a fuchsin jelly for pollen. *Numount*, in xylene or toluene, is a synthetic neutral mountant introduced as an alternative to Canada balsam, and is also used in thicker solution for thicker mounts. *Alcoholic Mountant* accepts specimens direct from *iso*propanol, while *Aqueous Mountant* accepts specimens direct from water. John Carter had mentioned the difficulty of supply of high refractive index mountants for diatomists at a reasonable price, and as a result *Naphrax* was introduced, followed by *Dirax* for larger specimens. These have now won some reknown. When problems emerged with some manufacturers' non-drying immersion oils, and some had to be taken off the market, NBS developed two viscosities of such oils.

To facilitate the study of living protozoa, *Protozoa Study Solution* was introduced, and this had found a use also in work on small freshwater crustacea. The firm also made or supplied all the equipment specified in *NBS Practical Microscopy*, and by 1981 held stocks of almost all that was needed for microscopy. In that context, it might be of interest to state that all slides carrying NBS labels (See Plate 1) were mounted by me in person, with the exceptions of diatoms (mounted by John Carter), and rock sections and micro fossils (mounted in the geology department of a university). Small packs of stains, reagents, and solvents were a speciality for the amateur worker.

In 1972 Thomas Salter Limited arranged with us to supply sets of microslides to be sent out with their series 1, 2, and 3 microscopes; we also supplied slides to be sold with the Offord 20× microscope. In 1978 NBS moved to purpose-designed premises on Martlesham Heath Industrial Estate, on the outskirts of Ipswich. The move took a month to complete, with no disruption in service to customers. After this move a series of Practical Microscopy Kits was made available, to be used with the various booklets; these allowed the preparation of fifty mounts to proper standards, and are still in strong demand fifteen years on. More recently, a series of Practical Microscopy Videos has been launched, to allow demonstrations to be followed at home, supplementing and enhancing the booklets.

By the end of 1983 we were supplying two microscope manufacturers, five wholesalers, and thirty seven retailers, as well as direct to those in more remote areas. It has always been a prime concern to provide for the amateur at home, but NBS has also prepared large orders for export and for manufacturers at home. The slides sent out with the Lensman were made by us, and demand by diatomists for *Naphrax* is world-wide. In 1988, because of the demand for short courses in addition to the annual course at Belstead House, four teaching units were added to our laboratory. At the present time development of new reagents and mountants continues, largely in response to direct demand. Examples include Aceto Fast Green to stain the venation of dipterous wings, and ABO Single Stain for mounts of whole and part arthropods, which are usually colourless after softening. A recently-introduced piece of apparatus is the *Polarspex*, used on any microscope stage to show polarization colours; a set of organic crystal mounts was introduced at the same time.

Continuous work on techniques (what in large companies is called research and development) still goes forward, of course. As an example, in 1989 we published John White's *Pollen, its Collection and Preparation for the Microscope*, which advocated the use of basic

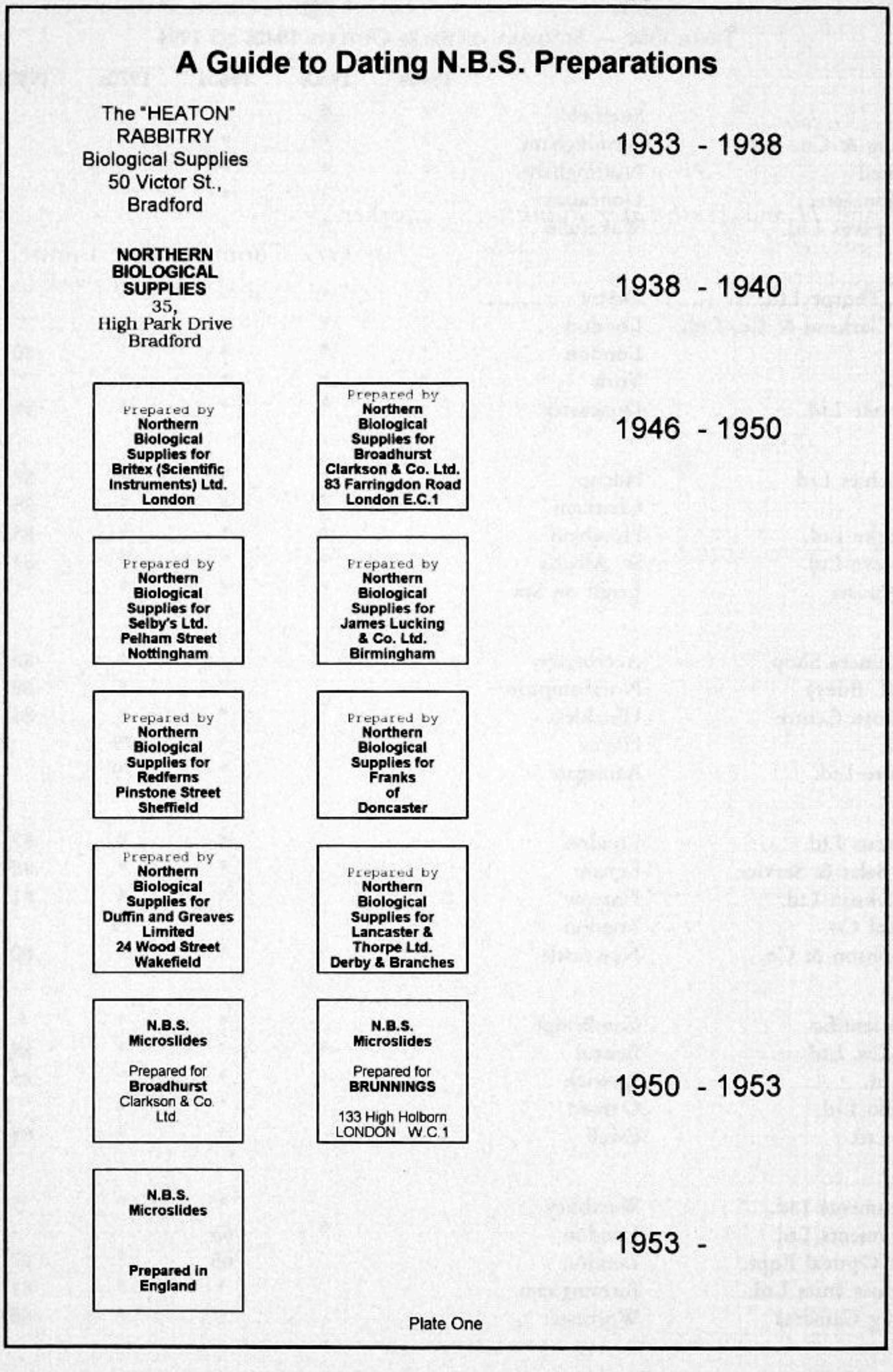

FIG 1. A guide to the dating of NBS preparations.
The design of labels attached to NBS preparations has changed over the years, as shown, and they provided an accurate means of dating older slides.

fuchsin for staining after collecting in a tube of alcohol. This provoked discussion and development, as some such mounts had darkened, and in 1993 at Belstead House courses a new technique was trialled, with collection using slides coated with a thin layer of glycerine jelly, staining with safranin, mounting in *Aqueous Mountant*, and sealing with *Jelseal* and *Bioseal II*. This technique may be adopted in setting up a national pollen bank, if wider trails are successful.

TABLE ONE — SUMMARY OF SALES OUTLETS 1940s TO 1994

Retailers		1940s	1950s	1960s	1970s	1980s	1990s
Redferns	Sheffield	*	*	*			
James Lucking & Co. Ltd.	Birmingham	*	*	*			
Selby's Limited	Nottingham	*	*	*			
Franks of Doncaster	Doncaster	*	*	*			
Duffin & Greaves Ltd.	Wakefield	*	*	*			
Lancaster & Thorpe Ltd.	Derby	*	*	*			
Broadhurst Clarkson & Co. Ltd.	London	*	*	*	*	*	*
Brunnings	London	*	*	*	*	80	
Aitken & Co.	York	*	*	*	*	*	90
R. & B. Brooke Ltd.	Doncaster		*	*	*	89	
D. & S. Brochies Ltd.	Sidcup		*	*	*	87	
C. L. Bond	Chatham		*	*	*	85	
Clement Clarke Ltd.	Horsham		*	*	*	85	
Freeman Grieve Ltd.	St. Albans		*	*	*	83	
B. Giles Chemists	Leigh on Sea		*	*	*	*	*
Lewis the Camera Shop	Accrington			*	*	86	
Imago (A. M. Biley)	Northampton			*	*	88	
Hinckley Photo Centre	Hinckley			*	*	84	
E. Moss Ltd.	Hayes			*	79		
R. & J. Moore Ltd.	Ramsgate			*	79		
Edward Marcus Ltd.	London			*	*	87	
Microscope Sales & Service	Egham			*	*	88	
Palmer & Jackson Ltd.	Harrow			*	*	81	
Revor Optical Co.	London			*	79		
Frederick Robson & Co.	Newcastle	*		*	*	80	
Campkins Scientific	Cambridge			*	*	*	*
Salanson & Co. Ltd.	Bristol	*		*	*	88	
Sneezums Ltd.	Ipswich			*	*	85	
Science Studio Ltd.	Oxford			*	*	*	*
Matt Skipp Ltd.	Ewell			*	*	85	
Triton Instruments Ltd.	Westbury			*	*	*	90
Rekab Instruments Ltd.	London	*	65				
Technical & Optical Eqpt.	London		65		*	87	
J. M. Townrow Insts Ltd.	Birmingham			*	*	81	
David Waring Cameras	Worcester			*	*	88	
Appleton Wood Ltd.	Birmingham			*	*	86	
Fernley Wallis Ltd.	Plymouth			*	*	*	*
Wiggin & Son Chemists	Ipswich	*	*	*	*	*	
Youngs of Leicester	Leicester	*	*	79			
Arts & Crafts Studio	Chester			79		*	*
Harrison Parkinson & Co.	Bradford			*	*	89	
Shackleton & Co.	Abergavenny				79	85	
Lizars Ltd.	Dundee & Glasgow				79	*	*
Mackay & Lynn	Edinburgh				79	89	
Practical Optics	Barnstaple				79	*	*

TABLE ONE — CONTINUED

		1940s	1950s	1960s	1970s	1980s	1990s
Setmal Ltd.	Clevedon				79	89	
D. A. Tennant	Crediton				79	83	
Whitear Lapidary Co.	North Harrow				79	84	
J. Bailey	Dover					80-84	
Bio Science Supplies	Wolverhampton					81	90
Research Insts Ltd.	Perryn					*	*
A. & L. Sci & Opt. Eqpt.	Cleverleys					83	91
Hampshire Micro	Sutton Scotney					83	*
Northern Microscope Serv.	Blackpool					84-89	
Brunel Microscopes Ltd.	Bristol					85	*
Comrie & Mitchell	Nottingham					86	*
Baxter Stamp Exchange	Hull					87	90
Norwich Camera Centre	Norwich					86	*
Porter Nash Medical	London					86	*
Laboratory Analysis Ltd.	Exeter					87	*
Wholesale Scientific Instrument Suppliers							
Claritas Ltd		*	*	*	*	*	*
Pursers		*	*	68			
Newbold & Bulford Ltd.		*	*	*	*	84	
J. J. Vickers & Sons Ltd.		*	*	*	*	*	90
Highgate Optical Co. Ltd.		*	*	*	*	84	
Mirador Ltd.						84	*
Microscope Manufacturers							
Britex (Scientific Instruments) Ltd.		*	*	60			
C. E. Offord (Microscopes) Ltd.				63	*	*	*
Thomas Salter Ltd.					72	83	
Thomas Salter spares and accessories						83	*
Suppliers of Scientific Equipment to Schools and Colleges							
Hogg Laboratory Supplies			54	*	*	*	*
Suppliers of NSS Freshwater Identification Sets for Nuffield Secondary Science							
Philip Harris Biological					70	*	92
Griffin & George Ltd.					70	*	92
P. K. Dutt & Co. Ltd.					77	80	

NOTE:

In the above table, use of an asterisk* indicates provision throughout the decade, except for the 1940s where supply started in 1947. Use of a figure is the year in the decade when supply began / terminated.

Past and Future

From 1953 to 1986, NBS was a partnership between my late wife and myself. In 1986 it became a limited company with my daughter as Company Secretary, and myself as Managing Director. Over the last fifty years there have been considerable changes in the way that NBS supplies have been marketed, although our policy of these being available through manufacturers and suppliers of microscopes has not changed.

As far as actual manufacturers are concerned, in 1960 Britex Scientific Instruments Limited ceased their own manufacture, and began to import the Swift range of microscopes (of Japanese make *via* an American company). Instruments are still made by Thomas Salter and by C. E. Offord, so here the change is only slight.

There have been changes in wholesalers, but Claritas Limited, and Mirador Limited still supply. In the 1950s on High Holborn in London, both Brunnings and Rekab Instruments stocked our products. In 1965 Rekab closed, and their premises were taken over by Technical and Optical Equipment, who continued to hold large stocks of our products until they themselves closed in 1986. Brunnings ceased trading in 1981, and this kind of pattern has occured elsewhere. Rent and rate increases, and competition from photographic and other chain stores, affected many family businesses which stocked our products after World War Two; some simply closed, and some were bought up on the retirement of the original owner by firms not interested in the microscopy side, or interested in stocks only for the Christmas trade.

The result has been that in 1994 NBS supplies direct to only sixteen retailers, but an examination of them does show that a change for the better has occured over the last few years. Specialist stockists of microscopes have been established, such as Comrie and Mitchell in 1965, becoming Lakeland Microscopes (Grange over Sands) later; Hampshire Micro (Sutton Scotney) in 1982, and Brunel Microscopes Limited (Bristol) in 1984. Between them they supply Japanese, Chinese, and Russian microscopes, and as specialists are a very welcome addition to the retailing side of our business. Of course, many other retailers take supplies of NBS preparations from wholesalers, and are thus not listed in the table. Business with customers direct has increased considerably in recent years, and as we are one of the few firms catering to such requirements, we look forward to many more years of service by NBS to microscopists worldwide.

Acknowledgements

I wish to thank Dr Brian Bracegirdle for all the help and encouragement which he has given me at all stages of the production of this article. I must also thank Fred Loxton for designing the plate on the dating of NBS preparations, and all those who sent me details of the labels on their collections of NBS Slides.

Northern Biological Supplies would not exist today had it not been for the unstinting support of my late mother, my late wife Lillian, my sons John and Eric, and my daughter Nancy, and it is a great pleasure to acknowledge their contributions over the years.