

DOUG BONE
Edited transcript of a video interview with Doug Bone
conducted at his home in Middleton, Suffolk by John Tolson on 20th March 2012.
Transcribed by Simon Taylor on 19th July 2015.

[Part 1 0:00:00] [*Title sequence, Bone at his desk.*]

[Part 1 0:00:22] Bone:

I'm Douglas Bone, born 17th of January 1945, so not quite the hundred years ago of Scott's anniversary of reaching the South Pole, but same day of the month.

[Part 1 0:00:38] Tolson:

20th of March 2012, at Doug's home. Can we start off, Doug . . . just give me a little bit of background on your early life – siblings, parents, where you were brought up, and . . .

Bone:

Right. Yes. I . . . only child. My father was a dairy farmer, down in Kent – right on the Kent coast, so I was born in 1945 right at the tail end of the Second World War, and my parents had spent the whole war down there and were right in the front line if there'd been an invasion, so been a fairly tense time for them. But yeah – I went to the local school, a local primary school, a local secondary school, and then went to Technical Colleges as they were called in those days to do O-levels and A-levels, and then on to Brighton Technical College where I did an HND in Applied Biology, and from there I joined BAS straight away.

[Part 1 0:01:48] Tolson:

Tell me a little bit about how you heard of BAS.

Bone:

Well, Vivian Fuchs did the Commonwealth Trans-Antarctic expedition in the mid-50s, which hit the headlines a great deal, and that fired my enthusiasm; that and hearing about the Antarctic and what it . . . in those days the whaling – from my godfather, who'd served on the research ship the William Scoresby [0:02:24. *Picture of the ship William Scoresby, probably off South Georgia.*], somewhere in the 30s. I'm not exactly sure of the dates, but . . . so I, long term, had an interest in that area but I think there's particularly Fuchs's expedition. Although that had precious little biology in it, it certainly made one more aware of the Antarctic and what was happening down there. So I enquired from BAS while I was still at college what the prospects were of getting a job, and eventually that led to me joining BAS and going to Signy.

[Part 1 0:03:07] Tolson:

Do you recall the interview, and where the interview was held, who was on the interview board?

Bone:

Yep. I was . . . I went up initially just for a chat with Bill Sloman, who was the personnel officer in those days, and then when I was called up for formal interview it was Bill Sloman and Peter Tolbrook (who was then working for BAS) and Martin Holgate who I think eventually became Government Chief Scientist or something of that sort, but he was Head of the Biology Section at BAS then. But by the time I actually started work he'd moved on, possibly to the Nature Conservancy – something else. But I did meet him a couple of times after that.

[Part 1 0:04:02] Tolson:
Interview – daunting?

Bone:

I didn't find it terribly daunting. They made one feel quite relaxed, and Bill Sloman's opening remarks were something like 'We can put up with quite a lot, but we don't like idleness, especially not when it's Bone idleness.' [*hearty laugh*] It sort of set the tone for the interview then!

[Part 1 0:04:35] Tolson:
So you clearly got the job. What was the job?

Bone:

Well, I was the first Marine Assistant. Signy Island was devoted almost entirely to Biology although they were still doing quite a big Met program there. There was some terrestrial biology and ornithology but they were at that time expanding the Marine Biology side of things, and there were several scientists going down there and I was going down to provide them with technical assistance.

[Part 1 0:05:11] Tolson:
But before you ever set foot on a ship to sail down you had a period of time in one of the offices – a couple of months or so?

Bone:

That's right! Yes. I joined in August and we actually left in October and in the interim time I was working in the . . . it was called the Zoology Section. Yes. The Botanists were in Birmingham, I think, so it was the Zoology Section that was housed in Queen Mary College, and life was pretty informal there at that time, and I spent most of my time working out what I might do with my own personal research project, but also chasing up purchases for the Base and making sure that people who were down there were getting what they needed to carry on with their work, so there was quite a lot of interaction with the headquarters office in Gillingham Street.

[Part 1 0:06:13] Tolson:
So they'd given you a kind of a carrot on a stick, hadn't they? You were supporting . . .

Bone:

Yes, that's right.

[Part 1 0:06:15] Tolson:
You were supporting, but you could choose . . . could you really choose your project?

Bone:

I suppose within limits I could choose my project, yes.

[Part 1 0:06:30] Tolson:
And had you chosen it before you ever left England?

Bone:

Oh yep. Yes. I decided that that was probably . . . there'd been a toe-hold of work done on the *Bovallia Gigantica* [*Bone actually said 'Bovallia Gigantilia'*] – the big amphipod that I actually worked on. The guy from the . . . who was staying at the British Museum, Mike Thurston, who had been a Halley Fid a few years previously – he had done a bit of work on

Bovallia from somebody else's collection of amphipods from Signy, but it was clearly an interesting enough beast that it merited further work, so that was what I did.

[Part 1 0:07:11] Tolson:

So eventually the day came to consider setting foot down to the *John Biscoe*. What were your thoughts at this stage, before you'd ever sailed? What did you anticipate about Antarctica, and the ship?

Bone:

Well, I suppose it all, like these things do, came at you in a rush in the final bit . . . but the BAS briefing conference, which in those days lasted about a week and took place in Cambridge, had prepared one quite well (very well, really) for what one expected in terms of life on a base, and some of the hazards to be aware of – being in the Antarctic generally. Not much was made of, or to prepare one for, the sea voyage down except it might be an idea to take some pills with you if you suffer from sea-sickness – although there was of course a ship's doctor to dispense such things if you . . . or there was a doctor on the ship to dispense such things. But it was very much an adventure and a very interesting new experience to sail the length of the Atlantic at a sedate eleven, perhaps on a good day twelve knots, and get a chance to watch whatever wildlife you were passing on the way. An interesting experience. We had certain duties to perform on the ship but they didn't take up a great deal of the time and they weren't terribly arduous. You learnt about holy-stoning the deck and . . .

[Part 1 0:09:05] Tolson:

You also made one or two shipboard lasting friendships.

Bone:

Indeed. Yes. Quite a few people who were on that trip south in 1966 I'm still in touch with today. Also the ship's officers I'm still in touch with today. Yeah, it was altogether a positive experience as far as I was concerned.

[Part 1 0:09:36] Tolson:

Malc . . . Captain Phelps, he went on to . . .

Bone:

Yes. Malcolm endeared himself to me, particularly towards the end of the voyage, because once we left . . . we sailed from Southampton to Montevideo, and a few days there, and then from Montevideo to the Falklands, and on that last stage of the voyage we started doing a formal Whale Watch, and it involved someone being up on the Bridge or the Monkey Island the whole of the day. We took it in turns, and I never had a problem getting up early so I used to take the early shift and I remember going up to the Bridge early in the morning, just after Malcolm as First Mate had started his watch and he'd sent one of the hands down for a large plate of toast and Marmite, and he freely offered me the toast and Marmite, which was very welcome as I'd just got up, and that became a regular thing for the three or four days before we got to Stanley, and I always looked forward to that. Yes – continued a friendship with Malcolm for the rest of my working life.

[Part 1 0:10:55] Tolson:

Tell me about your first impressions of Stanley.

Bone:

Stanley. Yes. Huge contrast to Montevideo! Yes, it was an interesting place. I can still smell Port Stanley. First of all I think from time at sea where there's the odd smell of diesel

and fumes and things like that and then you sail into Stanley Harbour and there's a very strong smell of seaweed, or smell of the sea as some people would put it but it's the seaweed on the shore, and then the peat smoke, and I remember it being very parochial and limited, but in those days the arrival of a BAS ship was quite a social event and one was invited along to the Catholic Church and to the Protestant Church and to Government House and things like that. I don't think it happens quite like that now, but it was interesting time then. Sort of bare countryside, just a grass, hardly any trees, and constant wind . . . Subsequent years, travelling down much more frequently, I got to know islanders and I got to see more of the Falklands and came to appreciate the place very much, and enjoyed being there. I don't think I'd . . . I don't think my liver would have quite stood up to the life style down there for very long!

[Part 1 0:12:34] Tolson:
Remember the days of Velma's pub?

Bone:
Velma's pub? Yes indeed! Yes, and The Globe.

[Part 1 0:12:49] Tolson:
So then it was off and . . . I presume you were heading in the direction of Signy, or perhaps South Georgia first.

Bone:
No, we went straight to Signy then. South Georgia at that time hadn't actually become a BAS base at all. There wasn't really a BAS presence there. I think the following season the botanists went down and did some work at South Georgia and I think it became more or less continuous after that, but I can't remember which year. Or perhaps it was – was it 1970, I guess – that BAS actually took over and became the presence on South Georgia, with Ricky Chinn going down as the first Base Commander for . . . and they took over Shackleton House. Yeah.

[Part 1 0:13:41] Tolson:
So you, as a 21-year-old – your first impressions of Signy. What do you recall now all these years later?

Bone:
Well, I had seen quite a few photographs of it by the time I went down, so I knew roughly what to expect, but what I hadn't really expected was that . . . was the rather exciting prospect of actually unloading onto sea ice, which . . . Well, Signy by some was considered a bit of a Banana Belt, but actually ramming the ship into the ice and jumping off onto the ice and sledging stuff ashore was real Antarctic as far as we were concerned, and it was all very new and exciting. Yeah.

[Part 1 0:14:34] Tolson:
And tell me who . . . some of the names of the scientists that you were going to be working with and helping, on Base.

Bone:
On base. Yeah. Well, I suppose, because he is such a well-known and lively character, one that first leaps to mind is Inigo Everson . . . typically greeted the ship from one of the dinghies because, the ice being what it was, they couldn't readily make out where Small Rock was, and Inigo and somebody else leapt out and pulled the dinghy across the ice to the little bit of water that there was and then got in and marked Small Rock so that Tom

Woodfield didn't run the *Biscoe* aground on Small Rock! We were able to get the ship just inside that. That was where the ice became too rigid for the ship to make any further progress. But another one that I met very quickly was Martin White who (sadly no longer with us, but . . .) – he had done one winter, and then he did a second winter, with me, and I worked a great deal with Martin. Other people there at the time: there was John Baker who was a terrestrial biologist; guy called Roger Beck – he was getting to the end of a two-year term (as was Inigo at that time) . . . Roger Beck been working on birds, and then with me there was (coming in) Nick Smith, who was going to work on freezing resistance of blood in notothenid [*phonetic*] fish. I think he was the only one who actually came in with me at that time. There was Jim Conroy, arrived down for a summer, somewhat later in the season. Oh yes, there was ???[*inaudible* – ‘a guy’?] called Martin Lindsay, I think, working on lichens. That's the only ones I can recall . . . oh yeah, Ron Lewis Smith, who was a botanist. Ron was still there then, and he was again at the end of a two-year stint. Yeah.

[Part 1 0:17:26] Tolson:

Once the ship had gone and you were able to focus on your surroundings and the workforce . . . you at home had a fairly strong interest in angling.

Bone:

Yes.

[Part 1 0:17:42] Tolson:

Did you at this point start to think about comparisons between our temperate fish and cold water fish?

Bone:

Well I had learnt a bit about the features of antarctic fish before going down, but I was obviously keen to try and catch some on rod and line, which I did – quite a few in the course of two years! But they're not particularly fast moving. They're not exactly sporting fish, but we did discover that they're pretty good to eat and we did live off the land, more in those days than people do now. So fish were very welcome, yes.

[Part 1 0:18:40] Tolson:

So, your work area – did it narrow down to your project, or did you have to really concentrate on helping the other ???[*inaudible word*] scientists?

Bone:

No. During the summer months I was mostly helping other people. There was quite a lot of diving work going on, and we did have a professional diver, but you always needed to be somebody either in the boat in attendance or, when they were diving through ice, operating a rope because although they normally dived free from the boat in the summer months, diving through an ice hole they were always tethered with a rope. Obviously that's got to be tended, so you keep the right tension on the rope, and it fell to me to do a great deal of that.

[Part 1 0:19:33] Tolson:

Now, the Diving Officer was a brand new concept the year you went down.

Bone:

That's right. Yes.

[Part 1 0:19:39] Tolson:

What do you think had happened in the past to make this necessary?

Bone:

Well I'm not aware that anything in particular had happened to make this a necessity except that it was felt that because most of the people who were going to be doing the diving were amateurs, or just trained to do the job (they had not had professional diver training) it was obviously common sense from the safety point of view to have somebody there to make sure the equipment was all safe and that people were doing the right thing, and not spending too long under water. There was no backup from a re-pressurisation chamber at that time. Subsequently there was at Signy, but we had to be very careful about the length of time that people spent under water then, so there was absolutely no risk of anybody getting the bends.

[Part 1 0:20:43] Tolson:

What was your . . . as the summer went on and winter approached did you start to think in any way 'My God! I'm stuck here!' ?

Bone:

No! [*shakes head emphatically*] No, there was never . . . any of that. The two and a half years I spent at Signy were probably the shortest two and a half years of my life. Obviously you got down – certain things would get you down from time to time, but overall I thoroughly enjoyed being there. That's . . . No, I never, ever wished that I could get away or what have you. Occasionally in those days we . . . it was common practice, and safety regulations would probably prevent it now, but we used to go off alone – for a holiday. There were a couple of field huts on the island and people used to take themselves off for a few days – alone – to the field hut and stay, and come back refreshed and . . . The biggest tonic really on Signy, I think, was a bright sunny day, because being the latitude that it is it's very much under a cloud belt, and suddenly you would get a bright sunny day and anybody who could just dropped their work and leapt off out with a camera, and at the end of the day it was very apparent – certainly in contrast to, like, the previous day – how buoyant everybody felt. The constant cloud, I suppose, did depress people a little bit but you weren't conscious of it until there was a contrast of a bright sunny day, and everybody got out, and sure they had a break – but they also enjoyed the sunshine.

[Part 1 0:22:41] Tolson:

In the sixties communications wasn't particularly a strong point of BAS, was it?

Bone:

No, it certainly wasn't! We had the monthly letter, which was 200 words in and 100 words out, and that was transmitted by Morse, and written down for you, and that was the sole communication that could be relied upon. I think at that time it was possible to make a telephone call via the ships' radio facility at Portishead, but it was very unsatisfactory and the whole world was listening in – nothing like privacy at all. Although single sideband on the amateur band did seem to work remarkably well, but regulations prevented you using that as a form of personal communication, except for the odd messages passed by the grace of contacts back in this country. But yes, obviously we had mail during the summer. I suppose – Signy we'd get four or five ship visits in the season, but come end of March or beginning of April when the last ship sailed away that was it, it was back to the Air Letters, as they were called, through until December.

[Part 1 0:24:19] Tolson:

Did you ever receive any particularly happy ones, or any particularly unhappy messages?

Bone:

No, I think I was lucky in that respect. There was no partic . . . no bad news coming in, at all. It was always good to know that the folks back home were in good health. So I was lucky from that point of view. Yeah.

[Part 1 0:24:50] Tolson:

As time went on at Signy you were obviously developing your own skills. Were you, – now I'm thinking into your second summer – were you thinking that you might be in for the long haul with BAS, or did you just view this as a two-and-a-half-year contract and you'd be finished?

Bone:

Yes. I think at that time I was just viewing it as a two-and-a-half year thing. It wasn't that, you know, I would have done it and wanted to get away, at that time, it was just that the way the organisation was set up at that time – I didn't really view, whether . . . There wasn't really a career structure that I could have fitted into. But as events turned out the cohort of people that I had gone south with, including the ones who were on Signy by the time I got there, really were the embryo of the structure of BAS as a science organisation, as far as Biology went. They all stayed on and formed the structure of the biology division, so in fact there was an opportunity to stay on with BAS when I got back – which I didn't initially take up.

[Part 1 0:26:30] Tolson:

Do you feel then that, say in the early sixties before you actually joined, that it was pretty nebulous – their scientific enquiry into all sciences – it was all a bit wishy washy?

Bone:

Yes I guess it was, because I think Survey had been one of the major things – Survey and Met [*Meteorology*] were I think the driving forces behind the Falkland Island Dependencies Survey. People – scientists – had I think hopped on the band-wagon of an opportunity to start doing things, and they were starting the atmospheric physics at Faraday (Argentine Islands as it was called then) and at Halley, and that work had started, and of course geologists were travelling out into the field, but the permanent structure for that was limited to a small number of people (if you like) at the top of the tree, and the people who were actually doing the work in the field tended to come in, do their field work, write up and leave the organisation. But as the science grew in importance in terms of justifying the expenditure on BAS then the science base was being expanded, and those of us who were around at the time were lucky enough to move into that area.

[Part 1 0:28:11] Tolson:

Of course it wasn't all work. You had some funny moments. Jim Conroy [*sic*] and the penguins and the skidoo . . .

Bone:

Yes. That was a quite remarkable incident in that, in my first winter initially we had a load of pack ice come in and freeze in, in June, and then we had a rather warm spell in July and it began to or it did break up, and most of it went out, and then very early in August we hit a spell of very calm very cold weather and we had some brilliant sea ice form up right across – solid fast ice across to Coronation Island, and everything. As soon as this was just about walkable-on people were out, walking on the ice and everything, and sea ice is a marvellous platform for doing marine biology in terms of . . . not towing nets, perhaps, but putting down traps and long lines and that sort of thing, and we were planning to put some fish traps, or

Glyptonotus traps I think, for Martin White, out towards the end of this particular day, and we'd been on the sea ice with the skidoo and sledge a bit before and the ice at that point was very flexible, and a group of people had done a circumnavigation of the island on foot that day, or on skis and they had just got back and they said 'Oh we'll come and take some photos of you cutting a hole to put these fish traps down' and things, so they piled onto the sledge. I was on the back of the skidoo and Martin was driving and we were driving out and we were just passing the aforementioned Small Rock where there was obviously a bit of a tidal eddy and the ice hadn't formed up quite as readily as it had elsewhere, and I just happened to turn round at the point that the ice split between the skidoo and the sledge, and I remember leaping off the skidoo and rolling away onto some firm ice and turned round to see Martin lying full length on the ice, forlornly trying to hold the skidoo up with one hand, and all it was was a yellow shape beneath the surface and of course that was rapidly going down followed by the sledge, and there was a slightly hairy moment because Richard Hillier the Doctor, Base Commander, had been sitting on the front of the sledge and he had his feet tangled round the runners, and only just got his feet untangled in time to nip off before the sledge upended and followed the skidoo down through the hole. So the following day we needed to rescue the sledge and the skidoo. This involved the whole base, and we got out onto the ice and we cut a slot in the ice from where these things had gone through back to where it was somewhat thicker and opened a large hole there, put up some sheer legs and grappled the sledge, and heaved that to the surface first followed by the skidoo. But in the process of doing this the Gentoo penguins around the island, that numbered. . . it must have been around fifty birds I should think, decided that this freeze-up was going to be long term, and if they wanted to feed they were going to have to go somewhere else. We looked up and we saw this column of penguins walking across the ice towards us, and we just happened to be on their path, and they came along and there was a column of penguins with one to one side at the front, one to one side at the back, and they came along and they stopped, in unison, and they peered at us, for a few minutes. We were all spellbound as to what was going to happen, and then the offsider at the front nodded [*Bone nods*] and the nod travelled back down the column and then the offsider at the back nodded, and in unison they all started off again and they walked past us and away and disappeared out onto the ice – which was quite an extraordinary experience.

[Part 1 0:33:04] Tolson:

So it was a fulfilled season anyhow – a fulfilled trip, in Signy. You, by the time you came to leave you felt you'd achieved . . .

Bone:

Oh yes! Indeed.

[Part 1 0:33:19] Tolson:

And therefore you were pleased to leave?

Bone:

I think I was ready to leave at that time, yes. You know – if something had happened to make me stay for a third year (as did happen to someone a few years later) I personally wouldn't have been too distressed about it, but I don't think that it's probably socially terribly good for people to spend too long in that sort of isolation, to . . . But do remember that we'd developed quite a number of local dialect words, and – quite a small number of them but were used in a rather different context – and I was getting a little bit worried at the time I left as to how I'd get on in normal society when people didn't understand these few words or their context, and . . . But I do remember moving onto the *Biscoe*, on which I left, and quite suddenly there was no problem, and it hadn't actually been a problem, and I wasn't really worrying about it. But . . . yeah.

[Part 1 0:34:28] Tolson:

And then you went down to the Peninsula where you had the most fantastic experience doing sealing.

Bone:

Yes. At that time there were still many teams of dogs, at Adelaide (forerunner of Rothera) and Stonington which was still open at that time. And it had been a practice for many years to collect something like four hundred seals, mostly crabeaters, as a winter food supply for the dogs. And a couple of years before a chap appointed as Senior Biologist to succeed Martin Holgate – was a guy called Ted Smith – had instigated a program of collecting data from the crabeaters – crabeaters particularly – and there was some interest in what was happening to their population because they feed exclusively on krill, and the whale population having been vastly diminished by the whaling there was theoretically a surplus of krill – and was this benefiting other krill eaters? Looking at the crabeaters was one way of getting a handle on this, so Ted had instigated collecting samples and measurements from these seals that were shot for dog food. I think Martin White did it the following year and then I did it in '69, when I came out of Signy, and gave me the opportunity to see the peninsula bases and get a lot further south than would otherwise have been the case.

[Part 1 0:36:19] Tolson:

Pretty horrible, bloody, work isn't it?

Bone:

It is. Yes. It's fairly gruesome work, sadly shooting so many seals. Not really a conservation issue because there are so many crabeater seals, but yes it was fairly gruesome work. I remember at one point being assisted by Chris Elliott, who was Third Mate on the *Biscoe* at that time, and I was suffering from a really dreadful cold because it was pretty traditional that you lived on Base for a couple of years and didn't have any illness at all and of course as soon as you came off Base and mixed with people who'd been in the wider world you picked up colds and similar ailments, and I got a real humdinger – but actually working up to your elbows in blood with a runny nose was a particularly unpleasant experience! *[laughs heartily]*

[Part 1 0:37:23] Tolson:

And you recall working with Chris. What was he doing?

Bone:

Well he was helping me. He was helping dissect the seals while I was taking out the technical bits, if you like and that, and we were both heaving them around on deck. Yeah. I think Chris might have been writing down measurements for me, and that was . . . you had to take top-to-toe measurements and various things. Chris might well have been writing notes down. It's a long time ago now – can't remember exactly who was doing what.

[Part 1 0:37:59] Tolson:

And from the Peninsula you got this magnificent tourist perception, and then I guess it was heading home.

Bone:

That's right, yes. I transferred to the old *Shackleton* for the trip home which was Captain Turnbull's last voyage with BAS and he pretty much left it to others to bring the ship home, and he had his own small yacht on board and he was busy working on that most of the time.

He had also bought in Stanley a Rolls-Royce that had belonged to Doctor Slessor, who had spent many years in Stanley as the local doctor, and he had retired and David Turnbull bought the Rolls-Royce, and that was residing in the hold, and he got one of the diesel mechs who was travelling home to fit it with the required lighting to make it legal for use on the road. It had one rear light or something, which was sufficient for Port Stanley . . . but I remember being down in the hold and there was this gentle creaking as the Rolls-Royce moved up and down on its springs with the motion of the sea.

[Part 1 0:39:25] Tolson:

You finally got back to the UK, Doug, and you had some writing-up to do in . . . your offices had moved, hadn't they now – from . . . ?

Bone:

That's right! While we were away we had moved, or the office had been moved from Queen Mary College to Monks Wood Experimental Station in Huntingdonshire, and it was much . . . the accommodation at Queen Mary College had been a semi-derelict old house and really wasn't very suitable for purpose, but we had some very nice buildings at Monks Wood – single-storey buildings, offices and laboratory and it was a very nice environment to work. Could be very noisy. The nextdoor neighbours was the United States Air Force, equipped with Phantoms, that seemed to use the station as an aiming point when they were doing touch-and-gos, but there was this wonderful wood – Monks Wood itself – to go walking in at lunch times, and it was a very pleasant place to work altogether.

[Part 1 0:40:37] Tolson:

You'd been away for two and a half years. Any adjustments getting back to civilised life?

Bone:

Well, I think probably those around me were more – would be better able to answer that than myself. I do remember it being slightly – a slight sort of schizophrenia about that, in that . . . in many ways, particularly when I got in my home town, it was as if I had never been away, or only away a couple of weeks, sort of thing. Walking about the town everything was so familiar. But then I would see some older person that I knew – Oh gosh! They're still around! – you know, and there was partly the feeling that somebody that old must have died while I was away. But I think you get over that fairly quickly. I had passed my driving test just a few weeks before going off South, and of course I hadn't travelled at more than walking pace for two and a half years, and I had – through the offices of my father-in-law-to-be I had purchased a car, which was waiting for me when I got back, and actually driving again was quite a frightening experience, and it took quite a while to pluck up the courage to do more than sixty miles an hour. That took a little bit of adjustment, but otherwise I wasn't that aware of being too much of a problem, getting back.

[Part 1 0:42:23] Tolson:

You completed your writing-up. What were the circumstances which sent you to your next . . . tropical island?

Bone:

Well basically I'd always lived beside the sea, and living in the middle of Cambridgeshire wasn't really what I wanted to do, and by the time I'd finished writing up I was married, and Sally was keen to live beside the sea as well. So we really were looking – we had some vague ideas of doing some travelling as well – and so I didn't initially take up the offer of a job with BAS, and then subsequently got the offer of a job on Aldabra atoll, working for the Royal Society at their research station that had just been established on the island, and we went out there for – it turned out to be sixteen months. And then . . . I was again offered a

job with BAS while I was out there – at the end of my term there – which I did accept, thinking that it would be wise to have something to go back to, and indeed stayed thirty-two years. [laughs]

[Part 1 0:43:53] Tolson:

I think it was . . . was it Dick Laws who actually wrote and asked you if you'd come back?

Bone:

That's right! Yes. By that time Dick Laws was in charge of the Biology Section at BAS, and he offered me the job when we were on Aldabra.

[Part 1 0:44:14] Tolson:

And it was a little trying, in getting home, wasn't it? You had a few complications getting . . .

Bone:

That's right. Yes. Getting off Aldabra was a fairly hit and miss process, and it was basically waiting for the right ship to make it all the way there and all the way back. And we came off via the Seychelles, so it was interesting to visit the Seychelles for a few days. And then we had the experience of leaving Mahé in the Seychelles at eight o'clock one evening, the temperature at about 32 degrees Centigrade, and 110% humidity, and arriving at Gatwick Airport at six a.m. the following morning with a temperature at minus five. And in those days you didn't walk out of the aircraft down a comfortable telescope, you came down the steps and walked across the tarmac, so dressed in tropical clothes it was a trifle chilly at that time.

[Part 1 0:45:18] Tolson:

Aldabra was a little bit of an Old Fids' Home, wasn't it?

Bone:

It was indeed. Yes. The research station had been built largely by Alan Smith, who had originally sailed south with me in 1966, and ???[*indistinct word*] gone down to Halley for the first real rebuild of Halley. Up to 1966 Halley had been added to in bits and pieces as the buildings had sunk deeper and deeper, but '66 they had a complete rebuild and Alan – Big Al as he was called – (Alan Smith) was a builder and he went down to do that. He did some building work at Signy before moving on down to Halley, and also on the ship then was . . . a diesel mech. I think he was, called . . . I can't remember his proper Christian name but he was always known as Abdul – Abdul Smith – and he also had been on Aldabra, I think at the same time as Alan Smith, and subsequent to my being there a number of other ex-BAS people came up, worked on the island. Yeah.

[Part 1 0:46:42] Tolson:

And if you were going to make any comparison about communications . . .

Bone:

Oh well, if anything it was worse on Aldabra than it was at Signy. We were very very limited in our communications. I think there was some fear that if communications were too good we could cost them a great deal of money by whistling up a ship if there was any sort of problem, but when we did actually have a problem the ship . . . we were able to whistle up a ship but it was done free gratis. It wasn't a problem.

[Part 1 0:47:22] Tolson:

You levelled certain criticisms about BAS, but how did BAS compare in the light of Aldabra?

Bone:

Exactly. BAS clearly had learnt a lot of the problems and were dealing well with the problems of a small number of people living in isolation, both what their needs were and the sort of people that should be employed to go and live in that situation, and this process had been much less rigorous as far as the Royal Society were concerned. Partly was their original intention was that most people should only be spending a few weeks on the island, but because of the shipping situation it just turned out that it was rarely possible for people to follow their original concept of just going for a month or whatever to carry out a short term science project, and it was necessary for people to stay there quite a bit longer.

[Part 1 0:48:36] Tolson:

So you finally made it back on a very cold winter's day, and what was the next thing you heard, after . . . Dick Laws obviously had invited you back, but . . .

Bone:

Yes indeed, and I contacted the BAS office as soon as I could after getting back and was offered the job and accepted it, so I had about three weeks between getting back from Aldabra and actually starting work again back at Monks Wood for BAS. Yes, and we were there for several years until the move into Cambridge, and the whole of BAS came together under one roof.

[Part 1 0:49:23] Tolson:

Were you at this rejoining stage working entirely in the UK?

Bone:

Yes. In fact I think it was specifically stated that I could not expect to go south whether I'd wanted to or not – that I could not expect to go south with this particular job. But of course over time things change.

[Part 1 0:49:52] Tolson:

All of these different strands of BAS – you had Monks Wood and then you had the Geophysics at Birmingham University and probably others elsewhere – how did you feel about this Lego thing that they talk about, all coming under one roof? [*The new headquarters in Cambridge were known in the Survey as Fort Lego, on account of the style of the building.*] Was it . . . did it feel good at the time?

Bone:

Oh it did. It seemed very good. Yes. There'd always been quite a lot of communication with other divisions, when people met up in various situations, and yes it was good to get everybody together under one roof, and looking back now it was quite a select company. There weren't that many people involved. In following years the offices filled up to overflowing, but those first couple of years that we were all together in Cambridge I ???[inaudible word – 'reckon'?] as being very good, with a good social life and things that certainly, across the divisions, we had lacked previously. Yes it was a good process.

[Part 1 0:51:07] Tolson:

A happy time?

Bone:

Yes. Definitely. Yeah.

[Part 1 0:51:15] Tolson:

And of course now Dick Laws was well in charge.

Bone:

That's right. Yes. Bunny Fuchs retired and Dick took over about the time that we moved to Cambridge. [*Jack Tolson was trying to talk at the same time but I have edited that out.*]

[Part 1 0:51:29] Tolson:

Did that mark significant changes in leadership level?

Bone:

I think it did. Yes. I think during his tenure Vivian Fuchs had been very good for BAS in his particular strengths, and the political side of things, and had done a pretty good job, but I think that when Dick Laws took over was particularly when science was, of necessity, gaining a great deal of importance within BAS, and Dick was extremely well connected on that front and was very good for the organisation in that respect, and he was hugely respected by people outside BAS.

[Part 1 0:52:27] Tolson:

Then suddenly – in 1977– you were working away on your projects and you were brought in as one of the scientists who were told to drop everything.

Bone:

That's right.

[Part 1 0:52:39] Tolson:

What was this God-Almighty-Important thing that you had to drop . . .

Bone:

Well . . . what I was dropping at that time – Inigo Everson was going to be working on energy budgets in antarctic fish – basically feeding the fish and analysing the energy content of the food and seeing what amount of energy the fish were using and things like that, which was largely going to be done in a circulating Flume system, which I had been building. And also at that time Barry Heywood had done some work in some rather peculiar lakes, down on the ice shelf between Alexander Island and the mainland, and these lakes existed essentially as melt water in the summer, but as he discovered it was actually a plug of fresh water floating on sea water. There was penetration right through the ice shelf to sea water beneath, and he found a very peculiar sort of fauna in these lakes, and he was planning to go back and do some more work there, and he wanted some means of catching planktonic animals, that he could lower through a nine-inch diameter hole [23 cm] that he could drill in the ice on the top of the lake, so I was in the process of building, or I had designed and was just starting on building a sampler that had an electric pump in it that would draw water through a net and collect planktonic animals. They'd lower this thing through the ice and switch it on, or it would switch on at the surface, and lower it down and it would pump for so long and then bring it back to the surface and hopefully extract some animals. But I often wonder whether the thing would have worked. Subsequently I discovered that actually sampling plankton with a pump system is not nearly as successful as one might expect it to be. I didn't know that at the time, but anyway it remains conjecture, and it was never built, because Barry was hived off Fresh Water Biology to become an Oceanographer, and it was all change from then on.

[Part 1 0:55:19] Tolson:

It's interesting to me that you were a biologist and yet it appears that a lot of your strengths were in technical matters and constructing things for other biologists to develop their own projects. Where do these strengths come from?

Bone:

Well, I think that I'd always had a bent for making things, and I'd been very lucky at school where at that time metalwork and woodwork were taught as a craft – there was never any thought of taking exams in woodwork or metalwork, but received a very good grounding in metalwork and woodwork, and I suppose this had set me up for what I found myself doing. Anyway, I had sufficient ability to work on the things that were required, at that time, which didn't involve huge amounts of engineering skill or knowledge. I could cope with that. But I also had an appreciation of the biological requirements for the equipment, so I think that was how it really panned out, that my career went along the path that it did. I always felt that I was a bridge between the scientists and the equipment providers, so I wasn't fully a technical person but I had the understanding to call on the right people at the right time, for gaps in my own knowledge or ability.

[Part 1 0:57:15] Tolson:

In 1977 then, the year that you were told to drop everything, this was the very beginning of this mysterious O.B.P. – which is Offshore Biological Program. In its embryonic stage what was it, when you went into this first set of meetings? Who was telling who what to do?

Bone:

Well, there had been a desire for quite a long time to re-start – essentially the work that had been done in the '20s and '30s by the *Discovery* investigations, looking at the biology of krill and their interaction with whales and things around South Georgia. Of course the whales were pretty much out of the picture by the '70s, but there was an increasing interest in fishing for krill, and it was realised that if there was intensive fishing this would have a very deleterious effect on the krill-feeding wildlife around the . . . well, South Georgia was the major centre in the BAS field of operations, and it was felt that it would be a very good idea to do some work on this. There had been one ill-fated attempt a few years earlier to start this work, but I think there was a further push at this particular time in that money was getting fairly tight and N.E.R.C. were pressurising BAS to try and get by with a single ship, and Dick Laws was definitely not happy with that state of affairs, but starting to use one of the ships for a science project increased the justification for keeping two ships, and I think the two things came together at that point, and this was how it started. And they used the best available expertise without actually having to get in a whole new team to do the work. So it was a change of discipline for quite a lot of people, but mostly people who had a background knowledge of what was actually required. So that was really how it all kicked off, and we had a long round that summer of visiting other laboratories who were doing the sort of work that we were going to have to be doing down there, and finding out the sort of equipment that could be used, and was available. That first cruise was pretty Heath Robinson but it did serve to give us a good background as to what really needed to do in the future, and what would work . . . the future. Yeah.

[Part 1 1:00:30] Tolson:

Yes. It must have been pretty grim. You were using a pretty standard ship shape to try and do some fairly serious scientific work. Frustrating.

Bone:

Yes, it was. It was very frustrating, but it certainly made one appreciate how hard people at the time of the *Discovery* investigations must have worked to get the mass of data that they

had got, because like the *John Biscoe* at that stage they didn't have the benefit of bow thrusters and super navigation systems that would allow the ship to be kept in one position, it was just extremely good seamanship that minimised the motion of the ship, in terms of keeping it in one place, particularly for oceanographic work, and keeping it steaming or moving very slowly in the right direction for towing plankton nets, which was not easy to do.

[Part 1 1:01:41] Tolson:

Just give me a basic picture now of the team members who were assembled and headed out to join the ship. I think you joined in Mar del Plata. [*That's right. - Bone.*] Who was the team, and what were you really going to focus on that first year?

Bone:

That first year . . . catching and finding krill was a particular focus. I think I was more attached to the krill side of things than anything else, but the krill side was down to Inigo Everson. We obviously needed Oceanography to back up krill work, and that was the remit of Barry Heywood, and Martin White was looking after fish because it was felt that it was an opportunity to do some work on the fish stocks around South Georgia as well, and also of course the plant plankton – phytoplankton – is crucially important as the principal food of the krill and the start of the food chain. And we had a chap called Terry Whittaker who was looking after the phytoplankton side of things, so there were four focusses at that time. And we were also looking at (I suppose initially rather incidentally) copepods, but we were looking for the younger stages of krill so we were sampling small plankton. We very rarely caught small stages of krill. We caught small species of krill (*euphasia superba* is not the only euphorsic [*phonetic*], there are several other small species) so we had a range of small-mesh nets, looking for those. But Pete Ward who had recently returned from Signy came along, I think initially as an extra pair of hands but he developed that job into a life's work on copepods, and he's still doing that now. So there were one or two other people who came along simply as deckhands, really, on the scientific side, to make it all work.

[Part 1 1:04:20] Tolson:

So you must have been an interesting and perhaps a frustrating band of scientists who gathered on the *Biscoe*, prior to the big refit of course. What did the ship's crew make of all this? And what was their response? Co-operative?

Bone:

Yes. Generally speaking they were very co-operative. Lots of time spent out on deck in the cold wasn't so popular, with the crew in particular, but yes – pretty universally the ship overall was extremely helpful to us and did their very best to make it possible for us to do the work with really at that time a fairly unsuitable vessel. Things became much better for everybody after the ship was converted to some sort of almost stern trawler, and we had good gantries for deploying the equipment and had a bow thruster to keep it pointing in the right direction at slow speed and that . . . but it still meant a lot of time outside for the crew, but it does to this day – but not as much as was the case initially.

[Part 1 1:05:44] Tolson:

But the frustrations on your part from a scientific viewpoint, not having the right equipment and a poor platform to work from, the frustrations that the ship must have had – the officers and crew – did you nevertheless get any worthwhile science, or was there a learning curve in more a technical matter?

Bone:

To be honest, now, I can't recall how much was published from that first cruise, but it was immensely important for all of us, just to see what the situation was. We had very little

instrumentation for the nets, and for a part of the time we did have an echo sounder that could see krill and we realised that this definitely had to be the way forward, that it was a vital component for use in the ship in the future – partly so that we could see the . . . or find the krill to catch them, but subsequently as it developed it became a tool in its own right for surveying the krill. So yes, it pointed us all in the right direction. Yeah. But it was very frustrating. It was made more frustrating that first season because it was a bad krill year, something that we learnt subsequently happens at irregular intervals, that the krill population drops away almost to nothing, which has disastrous effects on the wildlife, breeding cycle, but next year it would be back with abundance, probably. So we did really struggle in that first season, but a good grounding for what we were to do later.

[Part 1 1:05:44] END OF PART ONE [*Bone takes a drink of water*]

END.

PART TWO

[Part 2 0:00:00] [*Bone still drinking water*]

[Part 2 0:00:04] Tolson:

The nets I know we'll be discussing in greater detail later because you played an enormous and vital role in designing web-opening devices, but were these first-season nets really very very basic?

Bone:

They were. Yes. Very basic indeed. The most sophisticated we had was a Longhurst-Hardy Plankton Recorder, for catching small plankton. This is a device that has discontinuous bands of gauze and it has a net that funnels the catch down to this box that contains the gauze, which move forward at intervals controlled by some electronics, and it recorded the temperature of the water and the depth at the time that each sample was taken, so it gave us some idea of what we were catching where, but it was a relatively crude device and worked much better in much more sparsely populated water. We were frequently hitting densities of plankton, both zoo plankton and plant plankton, that were too much for this device and clogged it up, which was one of the reasons that we had subsequently to try and develop more appropriate equipment ourselves.

[Part 2 0:01:42] Tolson:

And the problems you also had in the *Biscoe's* pre-refit stage was the uncontrollability of the ship and the wires over the ship's side did on at least one occasion present enormous danger and problems.

Bone:

Yes. Indeed. Yeah. Recovering the RMT net on one occasion [*Rectangular Mid-water Trawl*] – that was on a very thick steel wire rope, and because we had basically had to let the ship drift sideways to recover this, the ship swung in a gust of wind on one occasion and swept the net round under the stern, so we were somewhat concerned about it winding up in the propeller, but fortunately it didn't happen, but it was a very close-run thing. But the oceanographers were deploying what was supposed to be a vertical wire with water bottles and samples on it and the ship did gather way on one occasion when the wind got up and the wire streamed astern and actually got taken by one blade of the propeller, which could have been a very dicey situation. The sensible way out of it was simply to cut the wire and lose everything, but the Mate of the ship at the time – Andy Baker – was a qualified diver and he

went over the side, in mid ocean, and under the back end of the ship and sussed out the situation – was able to send instructions up for a very small turn of the propeller which actually freed the wire, so the wire was recovered and it all lived to be used another day, which was a tremendous thing on Andy Baker's part and very fortunate for us. Yeah.

[Part 2 0:03:58] Tolson:

The *Biscoe* went in for a major refit in '79-'80. You by this time must have personally amassed an enormous amount of intelligence and you were clearly heavily involved in the design of the new stern-trawler-style *Biscoe*. Where were you positioned in all of this? Did you work with the shipyard, and the officers onboard the ship, to in any way . . . offer suggestions?

Bone:

We . . . Back in Cambridge we decided what . . . a series of meetings, but we decided what we would like and what could be afforded, and we sort of met in the middle from . . . You know, we would have liked more and things, but obviously there always has to be some compromise in these things. So we got to the position that could be afforded, and we designed within that, and we drew up the plans and we were fed ideas about the gantry and things and what could be done, and we accepted a particular design of gantry and then essentially left it then to the ship's officers (I think it was largely Chris Elliott who was driving this project on the ship's side) and the shipyard. I know it was a terribly difficult time for them because the shipyard that was doing the job was not as efficient as it might have been and it took much longer than had been hoped, or was expected even, and it was great credit to them that they achieved what they did. And then eventually we almost had to hijack the ship out of the shipyard and take it out on sea trials, which we did. We went off in November up to the west of Ireland and that was a fairly interesting trip – various things that worked and things that didn't, and suddenly finding all the taps run dry and when they tried to pump fresh water up to the tank that should supply the taps they discovered it was sea water, and there were various other rather frightening things that went on down in the Engine Room. We anchored off Ballycotton for a while while the engineers scratched their heads and found out what went through one bulkhead and what it came out the other side, and eventually we got out and then we were trialling the scientific equipment – winches and the gantry and things like that. So it was very much a big collaboration then between ourselves and the engineers and officers on the ship.

[Part 2 0:07:20] Tolson:

Were there any shortcomings in your scientific shopping list? Were there any things that they just couldn't afford, or couldn't supply, or . . . ?

Bone:

I guess not too many. I think in many ways oceanographic science was at a bit of a crossroads at that time. There was lots of new electronic equipment that was coming along, but hadn't reached a great pitch of sophistication, and there were various things that – not for that initial voyage or two but subsequently – we were promised the earth from bits of equipment but in practice didn't really work out the way it had been intended, and it took I think a few more years development work before this equipment was delivering what the inventors of it had thought would be possible. But yes it was a major step forward. We had a good echo sounder and subsequently we had other . . . (We initially had just 120 kHz single frequency, which is quite good for krill, but that was subsequently expanded to 38 kHz as well and then 200 kHz. You get more information if you have a range of frequencies.) Yes, I think we had pretty much what we needed to start with. We probably didn't have at that time the expertise to make too much use of too much more, but as we found our feet and that sort

of thing greater sophistication would have been better. But in terms of plankton sampling, which was I suppose my core work, it was then and I think it still is very much in the Stone Age compared with a lot of other sciences, and it's really quite tricky stuff to deal with. What we have found out – a lot of the shortcomings of plankton sampling – in the following years . . . I think there was a feeling amongst a lot of people in the early days that if you put a net in the water and towed it along everything that confronted it would finish up in the back end, but we subsequently realised it's far from being that situation.

[Part 2 0:09:58] Tolson:

I am sure that we will come on to that in greater detail on the next tape, but finally on this second tape do you think you also achieved a lot of political wins, yourself and Dick Laws, against the bigger powers – the NERCs and other bodies? Were you in a good position now, with this scientific platform?

Bone:

Oh, I think so. Yes! I think IOS which . . . (I suppose there's an institute that's originally grown out of the *Discovery* investigations) . . . there were certain factions there that rather pooh-pooed our initial activities, but as we began to have considerable success, and take a new approach perhaps to some of the problems I think we gained a lot of respect, and certainly we had a lot of help from them as an institute as time went on, and developed a lot of co-operations within them, so yes I think we did quite well. Clearly as time went on and subsequently the *Biscoe* was replaced the fact that it was replaced with a really major research vessel must have been down to the work that we did through the 1980s.

[Part 2 0:11:24] Tolson:

The *John Biscoe* has come out of refit. You've done your testing around Scotland [*sic*] – moderate success – a good new platform which hopefully the politicians within NERC will appreciate, and hopefully Dick Laws is very happy with. What was it really like down in the Antarctic? First of all tell me what equipment you now were able to operate.

Bone:

Well now we could operate an RMT properly with what initially on the first cruise I think out from the refit we had an RMT 8+1 where we were able to use a coarse-meshed large mouth area RMT 8 in conjunction with the small mesh one-square-metre-mouth-opening RMT 1 which was collecting the small stages of krill and smaller zooplankton, and the RMT 8 was collecting larger organisms – adult krill, fish and what-have-you. And we were able to open and close that net from the surface so that we could fish specific depth horizons and be sure that the catch came only from those depth horizons. So that was a very big step forward for us. We continued with a smaller Longhurst-Hardy Plankton Recorder for some purposes. On the oceanographic side we had a proper – I think it was in those days called an STD, now called a CTD – which stands for Salinity/Conductivity, Temperature, Depth – an electronic device which you can raise and lower on a vertical wire and it takes a profile of the ocean structure in terms of temperature and salinity with depth, which is vitally important for oceanographers, to work out what is happening, and you can also attach sample bottles to the device and trigger their closing at pre-determined depths so that you can actually get discrete water samples from the depths that you require, for analysis of phytoplankton or nutrients or whatever. So that was a big step forward also. And we had decent laboratory space to work. And we had the echo sounder – for the first cruise after the refit I think just the single frequency, we had the 120 kHz. That was soon followed by a much more sophisticated sounder which worked on 38 and 120 kHz and it had a computerised echo integrator, which allowed us to survey the krill, in that you can set parameters of depth and time of run and divide the voltage values of the returned echoes – divide them up into these set periods and depths and at some point you can relate those return voltages to a quantity of krill. The

advantage of having the two frequencies is that any one particular organism – in our case krill – will give a different strength of response to each different frequency but it tends to be characteristic for one particular organism, so the strength difference between an object on 120 and 38 kHz enabled people to identify whether or not it was krill. We did look at other things but krill was the principal target, so we were able to do quite a lot of survey work and actually quantify krill that way.

[Part 2 0:16:11] That led on to a discrete piece of work that we did a few years down the line when there was some concern about the target strength used for krill. This is a conversion figure to convert this voltage into a known weight of krill, and there were figures that were being used by ourselves and other people but nobody had a great deal of confidence in them and it was decided that we at BAS would have a stab at getting a much more reliable measure of krill target strength, and we carried this out in the 1987-'88 season, and we did it at Stromness on South Georgia. We chose Stromness Harbour principally because it appeared to have the least freshwater run-off of any of the convenient fjords (or inlets) on South Georgia that we could have used for this work. Very good access to the open sea for a ship to bring us krill in, and it did turn out to be an ideal site and we used a technique of having the krill in a cage suspended underneath the echo sounders, and these were all suspended from a raft. Stromness Harbour is remarkably deep – something like 60 metres deep – and this was ideal for the work that we were doing. We copied the technique from one that's used for similar work on fish, by a lab in Scotland, but we just adapted what we were doing for krill. Clearly they're very very weak as a target compared with fish, and so we had to be very careful about the cage that we used to keep them in, and things like that. It is a great deal of work, a great deal of preparation, and we knew that once we got there there was little opportunity to put anything right if we hadn't got the right stuff. Fortunately most of our guesses worked out right, and the few bits and pieces that we found ourselves in want of were found by fossicking round what we termed 'our friendly local supplier', which was the derelict whaling station that had been just left in 1964 when the whalers walked out and had never come back, so altogether it was a very successful season and we came up with a krill target strength figure, which was considerably different to the original and effectively multiplied the quantity of krill by about ten, and now twenty years on a rather different technique is being used – a mathematically generated model for target strength – but the figure that we got lies very much on the curve that has been generated for krill target strength, and so that's very pleasing. So all together it was a very good piece of work, and we all worked together very well. Inigo Everson led the project, and John Watkins from BAS was one of the other acousticians, myself dealing with a lot of the purely mechanical technical stuff. We had a guy called Bill Graham who was the electronics technician with us. We were assisted by Roger Coggan who came along as a pair of hands and then busied himself doing some work on fish, and then for a short period in that time we had an American acoustician, Ken Foot, who worked at the University of Bergen, and he came along for a crucial few weeks. Altogether a very satisfactory one-off experiment.

[Part 2 0:20:54] Tolson:

You've made it sound terribly simple, but I know that in fact it was an extraordinarily complex operation. Just in laying out cables on the bed of the lake, if nothing else . . .

Bone:

That's right. We were dropped in by *Bransfield* and we unloaded 23 tonnes of equipment for five of us for three months, so it was quite a bit, and we used the services of *Bransfield* to establish the moorings for the raft, which were quite substantial – very heavy anchors to hold it in place against what we knew were going to be some strong winds, and my goodness did we get some strong winds! – and, as is typical of the South Georgia fjords they . . . very strong gusty williwaws come down out of the mountains. We had to reposition one of the

moorings. We had a boat that enabled us to do that. There'd been some pressure on us just to take a simple inflatable boat, but we were very much afraid that we would have some really heavy-duty work to do, for which an inflatable's not sufficient, and so we went equipped with a glass fibre rigid dory and that proved to be absolutely invaluable and just exactly what we needed for that work.

[Part 2 0:22:25] Tolson:

So the krill project was a great success. You increased your known quantity tenfold. What did that actually mean in reality – to what you all as scientists were thinking of affecting the seal population, the penguins, the whales? Could it change that?

Bone:

Well yes, I guess it could do because the amount of food eaten by these krill predators was fairly accurately known, in that some very detailed studies had been done at Bird Island, where there's a lot of krill feeders, and they had a pretty good idea of the tonnage of krill (I can't remember the figure now but it is colossal) – the tonnage of krill that was being taken by the predators in a year, and one could possibly multiply that by the areas of penguin rookery or the areas of fur seal breeding around South Georgia to get a figure that would give you the total consumption for the island. And clearly if krill fishing had developed seriously it was important to know how much krill was in the water, versus how much the predators required to keep them-selves going. So yes, it was quite important to actually know the amount of krill there.

[Part 2 0:24:11] Tolson:

And commercial fishing at this time was I suppose in it's . . . it's still in it's infancy.

Bone:

Yes. I think fortunately krill turned out to be a very tricky thing to process, to produce a product that can be sold for a good price, so I think that that has actually limited the amount to which the krill fishery has developed. And ???[inaudible] that's fortunate for the wildlife really, that that hasn't happened.

[Part 2 0:24:41] Tolson:

So back to the *Biscoe* and its OBP properties – things did move along successfully. The relationship between ship and scientists remained . . .

Bone:

Yes, it was generally speaking very good. We always enjoyed terrific co-operation from the ship while we were doing our science and they were always very helpful. If you worked the ship 24 hours a day, which is quite hard on the scientists and we tended to work . . . well, we worked round to a system of working 12 hours on 12 hours off which we found was the least taxing. We tried other shift systems but 12 hours on 12 hours off did allow one to get at least one period of sleep when you could complete your sleep pattern and so we were working the ship 24 hours a day. There often tended to be a lot more done at night than in the day because krill were nearer the surface at night and we did quite a lot of sampling then, especially if we were simply catching krill to look at rather than to survey them we would do them at night. Subsequently, when the acoustic surveys for krill became really a major part of the whole thing that we were doing, on an annual basis – a regular survey . . . later we did organise that we did all the acoustic sampling continuously in daylight simply because the krill were down in the water where they could be seen by the echo sounder during the day time, whereas at night many of them came up to the surface where they couldn't be seen by the echo sounder. We did do some trials with an upward-looking sounder but it was very

difficult to interpret what we saw doing that and it certainly didn't allow us to make the quality quantitative surveys that we could do with the downward-looking sounder, so we took to sampling the krill – to actually get our hands on the animals – at night, with the nets, and actually surveying the quantity of them acoustically during the day time.

[Part 2 0:27:21] Tolson:

Were you actually able to process your results on board, at the time, or did information still have to go back to Cambridge to be processed?

Bone:

Yes, a great deal of stuff you did get the results at the time. Of course this grew even in the days of the *Biscoe*, before we moved to the *JCR* – the volume of stuff being recorded was increasing all the time. Computers became more and more important – virtually unseen on the first few voyages but as time went on more and more was being recorded on computers. I think it was the Echo Integrator gave a fairly immediate read-out so you could get a handle on what was going on, at the time. [*Pause. Drinks water.*]

[Part 2 0:28:35] Tolson:

When did you start to think that possibly this was a pretty good project and it was going to go somewhere and we'd need a new ship? Did you get vibes, or did people start asking you questions?

Bone:

Well. I think this was a gradual thing. I think it did actually begin to take off after the Falklands conflict, when BAS budget was dramatically increased. We knew that the *John Biscoe* wasn't going to go on for ever and BAS was clearly expanding in other ways and it was . . . at a lower level there was some planning, and then a bit further on this planning began to be hardened up and people got really behind it. The planning for the ship was somewhat taken out of BAS's hands. N.E.R.C. wanted to be a big player in the research, and obviously quite reasonably they wanted the ship to be available for research outside BAS, which is a rôle that it has in fact fulfilled enormously, but we were a little bit frustrated at times that we seemed to be a bit on the back burner as far as ideas were concerned, but we did eventually get most of what we wanted put into the ship, and . . . I can't remember quite what year we really got behind that, but it would have been the later 80s I think that planning really started. The ship was launched in 1990 so she'd been substantially built by then, so yes it'd be mid to late 80s when we'd come to get going, so it was ???[*inaudible word – 'pretty'?*] well immediately following the Falklands Conflict.

[Part 2 0:30:55] Tolson:

I guess, even in the years before the *JCR* was probably even a drawing you were being heavily approached by. . . I think probably Dick Laws and Barry Heywood to come up with ideas – hard ideas, new ideas . . . ?

Bone:

Well it was very much a division-wide project really. Everybody was having quite a lot of input. Chris Elliott, one of the *Biscoe*'s captains, was particularly keen on generating ideas for the new ship, and he had lots of very good ideas and was probably the first to put pen to paper. It didn't bear much resemblance to what we finished up with – there was a great deal more input after that – but at least it did provide something to start talking about. But of course widening out the remit for the ship meant that we had to . . . well, Geophysics was another major player in the use of the ship and that had a big influence on the way the *JCR* actually finished up being built.

[Part 2 0:32:25] Tolson:

I think, just getting back to the *Biscoe*, one of your other major clever projects was the compensating springs . . .

Bone:

Oh, for the nets?

[Part 2 0:32:40] Tolson:

For the nets, yes . . . [*both talking at once*]

Bone:

It was actually the *JCR* we started using . . .

Yes. Oddly enough the *Biscoe* had an over-side gantry for using small plankton nets, or vertical plankton nets, that had quite a good motion-compensating system in it. It was very simple – it was simply some springs. But because *JCR* was being built to cope with such a wide range of jobs the over-side gantry had to be so much more massive and the whole winch system was quite massive and it wasn't really possible to build in a compensation system that would cope with what was really a very lightweight piece of gear. So consequently people working on copepods, that they wanted to keep alive for some time, found it very difficult because in the act of towing this net slowly towards the surface it was actually rising and falling in the water, which had a very bad effect on the animals. All the vital bits would break off and then they would die fairly soon after being taken out of the net. So I found this way of making a compensation system that was built into the net, such that as the ship rolled away from the net a little bit more towing wire was let out from this unit on the net and it maintained the slow speed of the net up through the water rather than jerking it up quickly, and then similarly as the ship rolled back towards the net it took in the wire and still maintained the net's upward progress through the water. It worked well enough that there was a dramatic improvement in the quality of the animals being caught.

[Part 2 0:34:58] Tolson:

This was Pete Ward's project?

Bone:

This is Pete Ward's project. Yes.

[Part 2 0:35:08] Tolson:

The *JCR*, then, was a massive new concept. You got your plans on paper. You all knew what you wanted, albeit that you had probably compromised. When you went South on the *JCR* was it a wonderful experience?

Bone:

Yes it was. Obviously there were things to work out. Things were very different and it took us a little while to fully get into the ship, but in terms of a working platform and particularly in terms of personal comfort it was streets and streets away from the dear old *John Biscoe*. *Biscoe* for its size was a remarkably good sea boat. I experienced some extremely rough weather in it and never actually felt any particular fear. But the bunk rooms and accommodation were pretty spartan. As one got older one appreciated the comforts somewhat more, so to move into the luxurious cabin accommodation on *James Clark Ross* was something, and it did have a good benefit in that when you were working very long shifts it meant that when you did go to your cabin you weren't disturbed, whereas it was all multiple-berth cabins on the *Biscoe* and inevitably the whole ship was noisy from the

operations that were going on, whereas on *James Clark Ross* you could go and get your head down and know that you weren't going to be disturbed, which was a big benefit because at the end of a trip one tends to be pretty tired, but you were much more tired at the end of a *Biscoe* trip than subsequently was the case on *James Clark Ross*.

[Part 2 0:37:21] Tolson:

And all scientists were fighting for their sea time, weren't they?

Bone:

That's right. Yes – a lot of competition for sea time! [*laughs*]

[Part 2 0:37:33] Tolson:

I remember well officers saying that they had only just got into Stanley and they were expected to be going out the next day because sea time starts for the geophysicists, or the fish men or whoever it would be.

Bone:

That's right. Yeah . . . but we did come to realise that it was false economy of time to set out to sea too quickly. You can accomplish so much more tied up alongside in terms of getting equipment ready. You've only got to get rather a heavy blow when you get out to sea and it becomes very very difficult to get equipment out of boxes and get it set up and everything and you can do a huge amount in a couple of days tied up alongside, and then once you get to your working area you're ready to go, rather than struggling still to get equipment working.

[Part 2 0:38:39] Tolson:

So . . . we're very much now . . . new equipment. Can you tell me about any of the equipment specifically that you had had a big hand in moderating, and altering, and . . .

Bone:

. . . altering, and . . . well, the . . . I suppose one of the other things that I put a lot of work on was the replacement, or alternative, system for a large Longhurst-Hardy Plankton Recorder. We had tried a very large Longhurst-Hardy Plankton Recorder for catching krill specifically, because we . . . something that we couldn't get a handle on really any other way other than sampling within krill swarms was how a krill swarm's made up. Are all the animals in one swarm of the same year group or do you have two or three life stages in the same group? We were trying very hard to find this out, without much success and we thought that the LHPR run through an area of krill might give us this, but in practice the scales of krill swarms was smaller than it really needed to be to get the success with that method because you couldn't wind the patches of gauze on quickly enough without the krill just being completely squashed – because you had to use so much power to wind the gauze on, so we abandoned that and I developed another frame-mounted net that had I think about ten separate bags or nets at the cod end that could be fired off at very short intervals, and you could actually take a sample that . . . as little as 30 seconds at that time and this did allow us to get a better understanding of what was going on in krill swarms, but like all these things it took quite a long time to actually perfect it. One of our problems was lack of testing time because we were nowhere near the sea in Cambridge, and actually to get sea time to test full-scale pieces of kit was very difficult so generally we were testing equipment in cruises when we were hoping to use it, which is not always the best way. But we had discovered while using the RMT nets some years before that krill can actually detect the presence of the net quite some distance away and will swim out of the way of it, and the RMT suffers from the fact that it is stretched out on a diagonal [*gestures to demonstrate, 0:42:07*]. The highest parts of the diagonal which will appear first over the top of the krill swarm are not the bits that are going to catch it, but the krill will be disturbed and swim away as a result of that. We actually discovered this by

mounting an echo sounder – very temporarily – just above the RMT net on what we called the Instrument Cross, which carried the acoustic instruments that told us the depth of the net, and we ran this echo sounder with what was basically a long length of domestic flex, running from the sounder to the transducer, and we put this over the stern by hand. But it did give us . . . we were able to use two sounders and we had the one – the hull-mounted sounder on the ship that was showing us what the ship was passing over – and we lowered the net to the required depth but when the net reached the krill swarms they just weren't there. And if we raised the net some distance above the krill swarm then we could see them, so we lowered the net down again to the level of the krill swarms . . . they disappeared. So it was quite clear that they were actually avoiding the net. So we thought 'Now we know what the game is!' and, partly to overcome that problem, when I built the what I called the Antarctic Multiple Plankton Sampler I arranged it so that the towing point was well back from the mouth of the net, which gave us a few problems in stabilising the towing frame but it did mean that there was much less warning to the krill that there was a net on the way and that they should get out, and that was one of the features we tried to build into the net.

[Part 2 0:44:17] But in terms of other equipment, of stuff that we were buying in, a piece that on *JCR* we used a great deal was an Undulating Oceanographic Recorder, something that we bought in from Chelsea Instruments which is a towed platform that undulates [*gestures 0:44:48*] so that it can be programmed to rise and fall through the water column, and it's measuring temperature, salinity, light levels, plant (phytoplankton) levels and one or two other parameters but – characteristic of BAS – we were making this piece of kit work a lot harder than anybody else had ever tried to make it work and we found out quite a few of the shortcomings of the construction of this piece of kit and so I think we provided quite a lot of useful development for Chelsea Instruments over the period that we were using it. And we deployed this on a conducting cable so that the data was running up and down the cable the whole time and the cable is covered with a fairing, a streamlining material, that allows you to get to a much greater depth for any given length of cable but the stuff is quite delicate and handling it on the winch was quite problematic and we spent a couple of seasons actually working out how to get that to work really properly, and in the end we had a really pretty fool-proof system, so we did get pretty good at deploying that piece of equipment after a couple of years. Yeah.

[Part 2 0:46:27] Tolson:

Do you think that BAS has in recent years become something of a leading light in specialist underwater equipment for oceanographic work?

Bone:

Not particularly. I think that . . . I was always disappointed that actually doing development work didn't . . . there wasn't a lot of opportunity for it at BAS really. There was a lot more that we'd like to have done but we didn't have the resources really to do that sort of development work, which would have been very good to do but our resources were limited and we really had to deploy them . . . except where we would get nothing without developing something special or we wouldn't be able to do it. I think certainly in other branches of science that is more Antarctic-specific BAS now has been developing a lot of world-leading equipment, but in biological oceanography we didn't really get the chance to develop some stuff that we might like to have done.

[Part 2 0:47:57] Tolson:

As an actual leader in the pure science where does BAS stand, would you say?

Bone:

Ooh. Being a little bit out of touch with that now that's a rather hard thing to answer, but in terms of doing biological oceanography in the Antarctic I think BAS has, since we started doing that work, had high standing, and we've employed some pretty good people and I think that the results obtained have stood with the best that's available – in the world.

[Part 2 0:48:43] Tolson:

I mean 35 years, say, from the early 70s – it's grown from almost bucket and spade.

Bone:

Well it has, yes. It was pretty much bucket and spade when we first started, and is now extremely sophisticated.

[Part 2 0:49:07] Tolson:

And would that have been . . . and would all other nations, in those days – when you were first starting out . . . were they all on a par, or were we behind?

Bone:

Yes, I think probably they were. I think it goes back to what I was saying that we started that work when equipment had reached a point where there was a huge amount of development going on, with transistorised electronics, and people beginning to explore the possibilities. And of course it went very rapidly through that stage into all sorts of magic chips and things like that, so I think it was at the start of an era when equipment – electronic apparatus – was going to mushroom, really. So I think that other nations were probably in pretty much the same situation that we were. They were acquiring all this equipment at about the same sort of time.

[Part 2 0:50:16] Tolson:

In all the successes of the *James Clark Ross* – you feel that by the end of your time with BAS it was a great achievement?

Bone:

Yes. I think so. I think we did achieve a great deal in those years.

[Part 2 0:50:35] Tolson:

What would you say was your greatest professional satisfaction in your time with BAS?

Bone:

Ooh. Well, I would say it was sort of spread out, really. I got a lot of pleasure out of seeing one of the pieces of kit that I had developed from scratch working efficiently, or seeing the ship working gear efficiently where I'd modified it, and things like that. Little things can go wrong very easily . . . a great deal of satisfaction out of seeing all these things that I felt I had improved along the way, and made it a bit more professional outfit and streamlined the overheads of working, so that little time is wasted preparing stuff so . . . And of course technology is always moving on, so other people following on behind me and doing now, I guess, what I was doing then – but I feel I left them with a fairly good starting place, anyway.

[Part 2 0:51:58] Tolson:

And in all your years in BAS, do you have a happiest moment?

Bone:

I can't think . . . I was very very pleased, towards the end, in my last year, to be awarded the Fuchs Medal, which I felt was a great accolade because it comes from one's peers. I was

very pleased to receive that. I think the single thing in terms of a piece of work that I can probably look back on with some of the greatest satisfaction and enjoyment was the Krill Target Strength Experiment at Stromness, and that's partly because we got a very good result, and partly because it was very compact – it was an entity within itself, which a lot of the work that we do isn't – it's always ongoing and you always feel there is something else that you've got to do to push things further forward, whereas with that we got a good result and we were happy to go home with it. And that resulted from a lot of intelligent guesswork that took place before we set off on the trip, and so from that point of view that is something that I will always look back on as being a particular high point. Good companions while we were there as well. It was a happy shore base – that period. Yeah.

[Part 2 0:53:41] Tolson:

But you've spent many years at sea with BAS, haven't you . . .

Bone:

Yes, I certainly have.

[Part 2 0:53:49] Tolson:

Happy communion between ship's crews and . . .

Bone:

Exactly. I would say that – knowing what happens in some other people's workplaces – I realise that I've been really very privileged to have had a very happy time while I've been working – working with some really super people, and know that my work is appreciated, and can appreciate where it fits into a bigger picture. So yeah, from that point of view very very satisfactory. Yes.

[Part 2 0:54:28] Tolson:

There are many people inside BAS and outside of BAS (I don't know about many inside but certainly those outside) who say it's a shambolic organisation, but I personally disagree. Where do you stand on that?

Bone:

Well, I think what one should say is that perhaps they should try running something the equivalent that far away from home, and something that's been as successful and embracing such a wide field of science and endeavour. I'm not sure what the current situation is. I know that around the time I was retiring the cost effectiveness of BAS was far greater than any other of the national Antarctic organisations'. The cost of a scientific paper produced by BAS, on the Antarctic, was less than the cost of any scientific paper produced by many of the other nations working down there. Of course, much more expensive than something produced by a research institute working on some UK problem because they don't have the overheads of running ships, bases, aircraft and everything to get the data – all that money that has to be spent before a scientist has set foot on the continent, so they can't really be compared. You have to compare across Antarctic institutes from nation to nation, and BAS is always doing extremely well on that front.

[Part 2 0:54:13] Tolson:

And a last thought – one of your scariest moments. Can you think of something that . . .

Bone:

Phooaw! Scariest moments. Oh dear! [*pause for thought*] There's one particular hair-raising moment I can think of, on the *John Biscoe*. We talked about using a CTD over the side. We were doing a little bit of extra oceanography in the middle of the Drake Passage. I

got up to start a shift at about 4 o'clock in the morning and they'd . . . person going off had hesitated to put the CTD over because the weather conditions were pretty bad (a very strong wind and big sea), so when I went to the Bridge at the start of the watch we discussed whether it was OK, and decided that from the weather pattern it looked as though the weather would not get too much worse, and as this was going to be a very deep deployment and ???[*inaudible phrase – 'we were going to'?*] take several hours and it would be daylight by the time it reached the surface and the Mate (he was Robin Plumley at the time) was confident that he could hold the ship in position so we decided to launch the CTD, which we did and it was down at the bottom of the cast – fifteen hundred, two thousand metres – something of that order – when instead of clearing up the weather decided to take a turn for the worst. And to launch and recover the CTD on the *Biscoe* we had a little platform that stuck out over the side of the ship, from the Main Deck, and that's where one had to be in order to recover this thing. So eventually it got to the surface. It was blowing about 60 knots and a tremendous sea and ???[*inaudible – 'I remember'?*] being out on this platform and waiting till the . . . we'd brought this thing up nearly to the surface and then waited till what looked like it'd be a flatter spot in the waves, and I nipped out onto the platform to help recover this and it was very good winch work by John Summers the Bosun's Mate, and we whipped this thing up to the platform and I grabbed it and plonked it onto the platform and turned around and there was an enormous wave curling along the side of the ship and the crest was nearly up to the platform. It was quite a heart-stopping moment but it was OK – I was tied on! [*laughs*] Yeah.

[Part 2 0:59:34] Tolson:

Doug, thank you very much indeed for your memories of BAS Oral History.

Bone:

Pleasure.

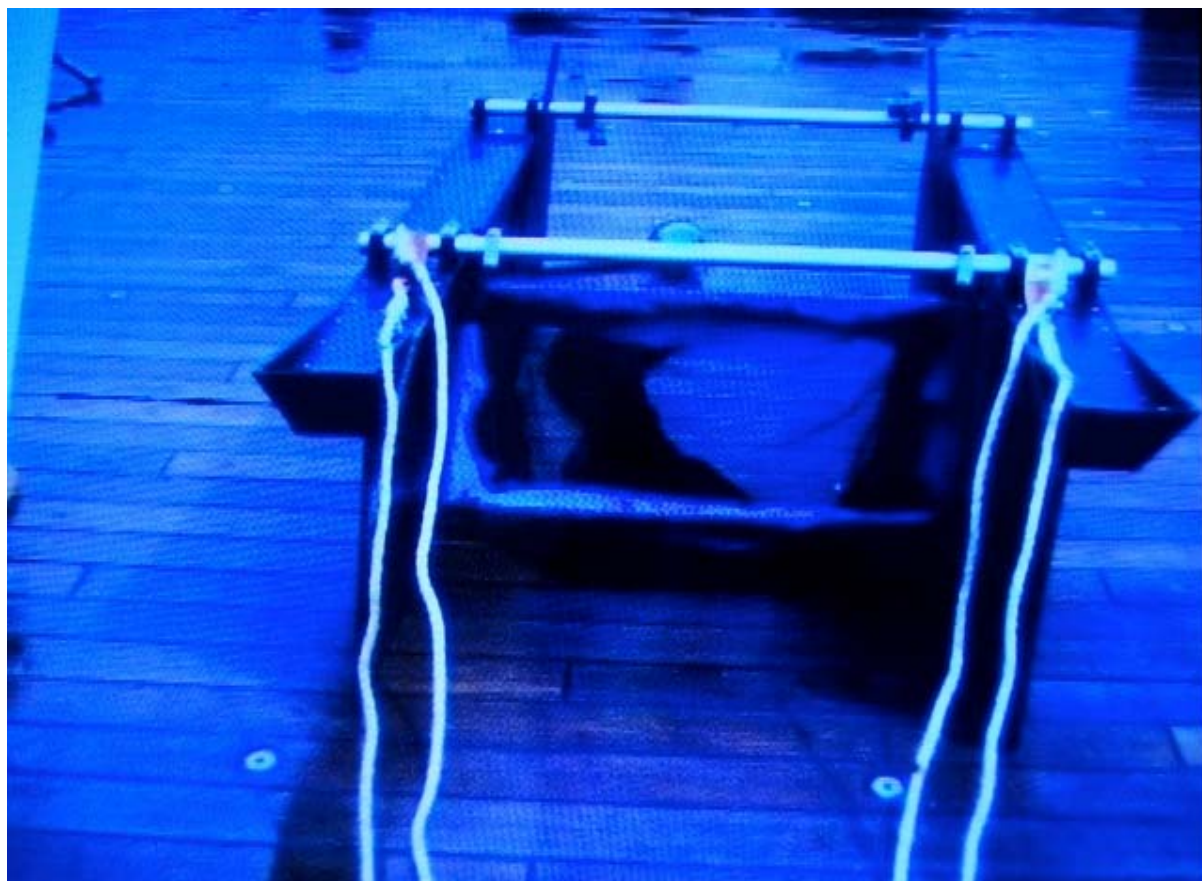
END OF INTERVIEW

APPENDIX (with illustrations)

[Part 2 0:59:42] [*title screen 'Talking with Jack Tolson'*]

[Part 2 0:59:47] [*title screen 'Douglas Bone Explains some of the Equipment'*]

[Part 2 0:59:51] Bone:



A Neuston Net, which is a fairly standard piece of oceanographic equipment, and it's designed really for catching (particularly) larval fish, that tend to come to the surface at night. Typically we would deploy this net from the front of the ship – a specially installed boom that we could swing out over the side of the ship and tow this in the surface water at night and it also proved to be a very good way of catching krill at times as well. So it was quite a useful net.

[Part 2 1:00:35]



This a straight . . . something [*sic*] that we got into towards the end of my career, which was deploying moored instruments off South Georgia in order to get data year-round on plankton movements and on the oceanography. What you see in this picture is the large lump of . . . which really are railway wheels, which is what they look like, and that's a weight right at the bottom.

[Part 2 1:01:10]

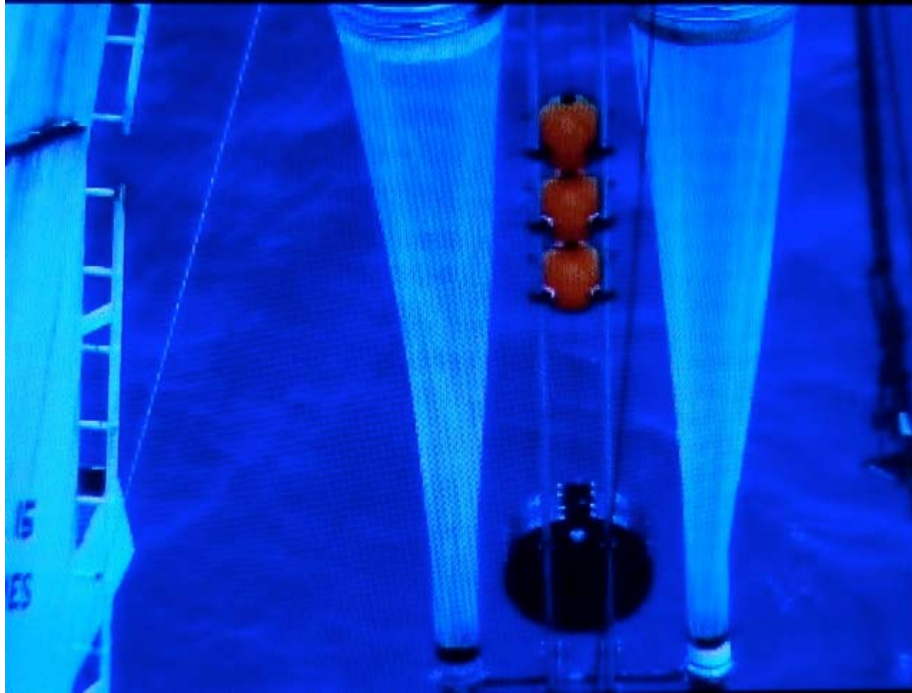


The smart cylinders here are again as a release mechanism and then there is several hundred metres of rope above that until you get to the buoy here:



which carries the instruments, and once the weight was settled on the bottom the buoy was submerged by about 200 metres and was carrying out current speed and direction measurements above the buoy and also measuring the plankton, hopefully krill, in the water column above the buoy.

[Part 2 1:01:46]



This is a picture of the motion-compensated Bongo Net, that I built and which did an enormous number of hauls to gather live copepods from the *James Clark Ross*.
[picture]

The idea is that using this net when you're hauling it steadily upwards through the water column it's not subject to increase and decrease in speed due to the roll of the ship, and that motion is largely taken out by the compensation unit which is housed in the black drum near the bottom of the net and that proved to be a very successful piece of equipment.



[Part 2 1:02:41] [picture from 1:02:50]



This is a better illustration of the net monitoring equipment for the RMT. At the bottom is the stainless steel release mechanism, and that's all been loaded up with all the bridles in the latches just before deployment, and the other cylinder contains all the electronics for the monitor system – the communications with the surface and interpreting the signals from the various sensors that are attached to the monitor. With our old ship – with the *John Biscoe* – the only link we had with nets was an acoustic one and it wasn't very reliable, so we had a conducting cable built into the *James Clark Ross* which allowed us to have constant contact with the nets, and also measure a great many more parameters so get a lot more information each time.

[Part 2 1:04:01]



This is another version of the RMT – our RMT 25, which has a 25 square metre mouth opening and a larger mesh than the eight mil, and that's used to target . . . well, typically myctophid fish, and squid – squid and octopus in deep water.

[Part 2 1:04:26]



And this beast is an Undulating Oceanographic Recorder, developed by Chelsea Instruments. It's a piece of equipment that we purchased for use on the ship, for oceanographic survey work, but we were putting it through its paces somewhat more than most institutes had done and subsequently we found out its weak points and really were able to do some joint development work on this piece of equipment with the manufacturers, and after a few years we had a very efficient piece of equipment.

END



Points of general interest:

PART ONE

- [00:04:36] Bone was the first Marine Assistant at Signy Island.
- [00:07:31] BAS Conference. Travelling South by ship.
- [00:09:39] Whale Watch
- [00:12:54] South Georgia was not a BAS base originally.
The first Base Commander for BAS was Ricky Chinn.
- [00:13:51] Unloading the ship onto the ice.
- [00:17:53] Catching fish to eat at Signy.
- [00:18:53] Diving safety at Signy.
- [00:20:43] Morale. Local holidays. Seeing sunshine.
- [00:22:39] Communications.
- [00:24:5] The increasing importance of science in BAS during the 1960s and '70s.
- [00:28:11] Losing a skidoo through the ice, and later recovering it.
The disciplined behaviour of the penguin spectators.
- [00:33:20] Worrying about returning to the outside world. Local vocabulary.
- [00:34:28] Killing seals to feed the dogs. Scientific work on the seals killed.
- [00:38:11] Captain Turnbull and his Rolls-Royce.
- [00:39:35] Monks Wood Experimental Station. US Air Force next door.
- [00:40:37] Adjusting to coming home.
- [00:42:23] The Royal Society research station on Aldabra.
- [00:46:42] Communications. BAS v. The Royal Society.
- [00:48:47] BAS science moved to Madingley Road in Cambridge. Fort Lego.
- [00:57:15] Offshore Biological Program
- [01:04:20] Co-operation with ships crew

PART TWO

- [0:02:04] Untangling a wire from the propeller.
- [0:03:58] Major refit of RRS *John Biscoe*.
- [0:09:58] Attitudes of NERC and IOS to BAS taking up offshore biological research.
- [0:35:08] The advantages of a more modern ship (*JCR v. Biscoe*)
- [0:38:39] Developing methods of catching krill samples.

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