

Is there anyone who has ever played the game who hasn't had visions of being a golf course architect?

All golfers, from the top of the PGA Tour to the last little youngster in a junior tournament, all have illusions about the golf courses they play and those they would like to play. How often have you glanced out of the car window to see a grassy, wooded meadow and thought what a wonderful little 4 par that would make?

I did the very same thing in my younger days, and I still do. In my case, with a very famous father blazing a legendary trail in front of me, I actually *did* become a golf course architect.

Now that I look at it from the other side, it's amusing to hear the comment of golfers with regard to golf course design and construction. Years ago when Alister Mackenzie and Donald Ross were laying out courses, they would find a receptive piece of ground, a few mules and a drag line and get to work. A little mounding around the tees and greens, finishing work on the putting surfaces, some grass seed and a little water and you had a golf course.

However, in recent times, that has all changed. It often seems like most of the great sites have already been taken. In Japan they literally move mountains. In Hawaii we actually make topsoil out of lava rock. In the deserts of the Southwest we grow grass right out of the sand. In the US and Canadian Rockies we carve fairways right out of granite.

Finding the land is only the start of the puzzle. Then there is the endless permit process, including the EIR (Environmental Impact Report). Modern golf courses are now built to higher standards than ever before, and our private clubs and better public courses are now maintained in better playing condition than the generations before us ever knew. Even under ideal conditions, the design and building of a golf course today is a mammoth undertaking.

In getting ready to open our latest course in Madison, Wisconsin, we pulled together a few statistics and facts which will give an indication of what goes into a course in addition to a little seed, some sand and a few flags. Check these numbers: **Par** 72. **Hole variety:** five par threes, eight par fours, five par fives. **Length;** Tournament: 6,825 yds. Championship: 6,402 yds. Standard: 5,826 yds. Forward tees: 5,905 yds. **Area statistics;** Acreage: 310 acres, Manicured turf: 110 acres, Average green size: 6,500 sq.feet. Practice putting green size: 14,000 sq.feet. Chipping green size; 8,000 sq.feet. Average tee grouping size: 11,000 sq.feet. Acreage of fairways: 32.5 acres. Acreage of roughs: 71 acres. **Construction Statistics;** Turf laid during construction: 250,000 sq.feet. Irrigation pipe laid: 14.5 miles. Irrigation heads installed: 725 sprinklers. Satellite irrigation controllers: 17. Centralised computer controlled irrigation system: Toro Network 8000. Cartpaths: 21,500 linear feet. Drainage pipe installed: 2.15 miles.

In our company we have four project engineers, all of whom are accredited golf and landscape architects and fine golfers who maintain single figure handicaps. Each is a member of the American Society of Golf Course Architects, a



So you want to build a **GOLF COURSE?**

The Berkshire Golf Club under construction in 1928, using horses, manpower and drag lines. A far cry from its higher budgeted neighbour of 1991, Wisley Golf Club

prestigious organisation which promotes and elevates the game in every way possible.

What's the point of all this? It is simply that the specialised construction drawings for grading, drainage, irrigation and the various other details are never seen by the golfer. The blasting and the handpicking of rocks occurs long before the first shot is hit. And the talented people who design and build golf courses are not often visible either.

Those beautifully turfed golf courses that you enjoy are not laid out casually on the back of an envelope. Nor are they the result of pushing a little dirt around and throwing some grass seed on the ground. They are the result of talented and skillful people devoting what is often the better part of three years to plan, design and construct.

So the next time you think about becoming a golf course architect, remember it takes more than just a good golf game. Just as becoming proficient as an expert golfer requires years of play and countless hours on the practice tee, so too is a long apprenticeship needed to be a real golf architect in fact. Just as the great player makes the game look easy, so the best of golf course architects often make their work look easy, too. Don't you believe it. I have a lot of dirty clothes and worn out shoes to prove how tough it really is!

■ The author, Robert Trent Jones Jnr, is the famous son of a famous father, together responsible for the design of hundreds of courses around the world. The new Wisley Golf Club in Surrey, due to be opened this month, is a Robert Trent Jones Jnr creation. Our thanks to Bob Murphy and "Reading The Green" for generousities extended.



Go with **BIGGA** to the *GCSAA Conference and Show* in **NEW ORLEANS**

12-19 February, 1992

Main details

Airline: American Airlines
Airport: Heathrow

An aircraft change will be required in Chicago of everyone on the outward journey with those returning from New Orleans again needing to change at Chicago.

Customs and immigration checks will take place at Chicago.

PACKAGE 1

7 nights Holiday Inn Crown Plaza – single
inclusive cost: **£999**

PACKAGE 2

7 nights Holiday Inn Crown Plaza – twin
inclusive cost: **£754**

PACKAGE 3

7 nights Quality Inn – single
inclusive cost: **£835**

PACKAGE 4

7 nights Quality Inn – twin
inclusive cost: **£679**

PACKAGE 5

6 nights Holiday Inn Crown Plaza – single
inclusive cost: **£1,321**

PACKAGE 6

6 nights Holiday Inn Crown Plaza, 4 nights on tour in Florida – twin
inclusive cost: **£949**

PACKAGE 7

6 nights Quality Inn, 4 nights on tour in Florida – single
inclusive cost: **£1,196**

PACKAGE 8

6 nights Quality Inn, 4 nights on tour in Florida – twin
inclusive cost: **£874**

The above prices include all travel, transfers and tours where indicated.

Insurance:

7 Days – £34.00
10 Days – £39.50

A deposit of £100 per person plus insurance if requested is required at the time of booking.

The visit is priced at an exchange rate of \$1.70 and prices may be reduced or increased if the change in the exchange rate exceeds 3%. Should this mean paying more than 10% in the flight price, there will be an option to cancel with a full refund of all money paid except for any premium paid for flight insurance and amendment charges.

Exercise of the right to cancel in those circumstances must be within seven days from the issue date of the surcharge invoice.

It's a holiday and learning experience rolled into one – AND it's the trip of the year and maybe the holiday of a lifetime!

As with this year's trip to Las Vegas, BIGGA will be joining with the IOG to visit the 1992 Golf Course Superintendents Association of America Conference and Show in New Orleans, which will be held from 10-17 February.

The trip will include an optional extension to Florida taking in the Everglades National Park, Key West and Fort Lauderdale for four days sightseeing and relaxation before returning home direct from Miami.

With a world class convention centre plus a rich heritage and countless cultural attractions, New Orleans will be an ideal venue for this prestigious event.

Two hotels are available – the Holiday Inn Crown Plaza situated about three blocks from the Convention Centre and the Quality Inn situated on Maison St Charles, a 20 minute walk to the centre and French quarter. Both hotels have all the usual facilities and are of the standard expected from four star hotels in America. Included in the itinerary is a three hour tour of the city on the Thursday morning which will enable the

group to gain a feel for the area. Flights will be with American Airlines departing from London Heathrow, with an optional supplement from Manchester.

Those joining the extension will depart New Orleans on 18 February for Miami where mini buses will be waiting to pick-up the party and will be used to transport the party during the four days. Arrival is anticipated by lunchtime at the Comfort Suite Hotel at Deerfield Beach, just north of Fort Lauderdale, giving an afternoon of relaxation before continuing the following morning via the Everglades (boat tour included) and the 49 bridges to the most south easterly point in the USA, Key West, for the last three nights. In addition to the good beaches, a number of places are available to visit, including the world's second largest coral reef.

At the end of three days in Key West, the party returns to Miami for a non-stop flight to London, which departs early evening.

Please complete and return the booking form – this can be photocopied or the details can be written on a plain sheet of paper if you don't wish to cut up your magazine.



BOOKING FORM • GCSAA Conference and Show, New Orleans

Please return to BIGGA, Aldwark Manor, Aldwark, Alne, York YO6 2NF

Full Name

Address

Telephone: (work)..... (home)

Name of additional passengers

1 2 3

Employer Occupation

	No. of persons		No. of persons
	£		£
Package 1	.....999	Package 5	.....1,321
Package 2	.....754	Package 6	.....949
Package 3	.....835	Package 7	.....1,196
Package 4	.....679	Package 8	.....874

I shall/shall not* require Insurance (*delete as applicable)
7 day.....£33.00 10 days (inc. 4 day extension).....£39.50

Are you a smoker?....Yes/No*

I wish to fly from Manchester (£25 supplement).....(tick if applicable)

I require internal flights fromto Heathrow for persons on (date)

Any other special requirements (vegetarian meals etc)

I enclose a deposit of £100 per person, plus insurance payment (if requested). TOTAL ENCLOSED: £

Deadline for deposit 30 September 1991. Final payment by 30 November 1991.

CANCELLATION PROCEDURE Period Before Departure Date	Cancellation Charge as a % of Total Holiday Cost
More than 56 days	Deposit only
56-29 days	30%
28 or less	100%

Under certain circumstances, cancellation charges are covered by the comprehensive travel insurance policy. As cover is provided by the insurance company from the date of purchase of the policy, insurance premiums are not refundable and are excluded from the total holiday price for the purpose of calculating cancellation charges.

■ I was disgusted to read in the June Surrey Section notes in *Around the Green* that certain people had been found to have 'lent' their BIGGA membership cards to friends in order that they may obtain a free round of golf.

In my opinion, as public flogging is no longer within the law, those involved should be properly exposed and have all privileges withdrawn forthwith.

Comment, please.

ROGER GLAZIER Cuddington Golf Club

At a time when greenkeepers are making such great strides in presenting a professional image I find such behaviour beyond comprehension. The act is not just irresponsible, it is tantamount to criminal theft. Personally I'm all in favour of a good flogging! – editor.

■ May I respond to Jim Arthur's article 'When Will They Learn', which I found entertaining. However, the facts are misconstrued.

Grass needs a balanced diet of nitrogen, phosphorus and potassium, as well as micro nutrients. There are a lot of phosphorus and potassium deficient courses all over the world and as phosphorus can be available or unavailable, why not take the guesswork out and recommend soil testing?

Pennecross was not bred to replace Bermuda grass in warm areas of the USA. It was bred to out compete *Poa annua* in cool northern climes, as a cool season grass. Because of its superior putting quality it has been pushed further and further south to replace Rye and/or Bermuda grass greens. Management techniques in the south are quite different to those in the north. It is a cool season grass, very aggressive in growth habit. If not managed properly it will thatch and spike up; however, if managed properly it produces a very good putting surface.

The principle behind USGA Spec. greens is improved drainage and reduced compaction – the biggest problem all over the world. Common sense tells me that USGA Spec or other greens which drain well and do not compact would be most desirable in the UK climate, which is cool and moist. A plant needs a certain amount of water to live. Because evapotranspiration rates are extremely high in the desert, water requirements are high. In Britain, evapotranspiration rates are low, thus water requirements are low. The need to get rid of water quickly (by drainage) is much more critical in the UK than in most other climates in the world.

We would welcome visits to East Sussex National by Mr Arthur or any other research organisation to run experiments and tests. In this business we can only go forward with continued research and experiments.

KEN SIEMS East Sussex National GC

■ I enclose a pamphlet that I produced for our Club members which may be of interest to BIGGA members.

The idea arose following a conversation with some of our lady members who genuinely believed that we "just cut grass".

I am pleased to report that the pamphlet has met with favourable comment, though we shall have to wait and see what effect it has in practice.

ED ROWSON Welwyn Garden City GC

The pamphlet, entitled 'They only cut the grass, don't they...?' is a little too long to reproduce here, but it outlines the complete role of the greenkeeper in golf course management. A bright and innovative idea, copies may be obtained by sending an SAE to BIGGA HQ at Aldwark Manor.

■ Your contributor, Cedric Johns, on the question of impounding winter water for summer irrigation omits two important points.

If holding lakes are constructed on a permeable subsoil, they have to be lined or puddled – no easy or inexpensive task. If such lakes are used as a water source – and the level is lowered – the puddling cracks when exposed to the air and the lakes cannot be brought up to their previous level. Furthermore, nothing looks worse than a dry 'water feature' – a muddy weed-infested wilderness. Holding lakes must not double as water features, but be kept out of sight.

The second point is that if reservoirs (ie. lined or puddled holding ponds) are built with the bulk of the excavation below the water table, when extraction lowers the water level inside to below that of the water table outside, the liner; plastic construction or even puddling will be blown out of the ground by ground water pressure – or at least ruptured and leak.

Construction of dams across valleys to impound water is not

COMPETITION RESULTS

Short of actually visiting Chateau des Vigiers Golf and Country Club in the south of France, designed by Donald Steel and built by our 'First of the Summer Wine' competition sponsors, Brian D Pierson (Contractors) Ltd, the next best thing is to enjoy some of their tempting wines. Results of the competition are now available and reveal the following three members as lucky winners of a case of wine bearing the distinctive Chateau des Vigiers label: Terry Tench from Northwich, Cheshire, Angus Gray from Stanton in the Wolds, Nottingham, and Richard Whyman from Bude, in Cornwall.

These three, selected at random from the competition postbag, will shortly be receiving their prizes for correctly completing the answers, which were:

1: Pete Dye, 2: 'The Way Forward' and 'The Demand for Golf', 3: Derek Ganning, The Belfry, 4: The Royal and Ancient Golf Club, The United States Golf Association, The English Golf Union, Federation Française de Golf (French Golf Federation), British Association of Golf Course Constructors, 5: Muirfield.

something to entrust to the local earth mover. It is all very well putting an obstruction across a small valley provided adequate spill ways are designed and constructed, but dams to hold back several million gallons need wing walls cut deep back into the valley side, and without fail-safe spillways etc. the whole lot can easily end up downstream, which can be a costly exercise in compensation.

JIM ARTHUR Budleigh Salterton, Devon

■ I write to thank the BIGGA HQ staff for their help in the 'Placement Referral Scheme', especially Debbie Savage, who was extremely helpful in relaying messages between me and my new employers. She played a vital role in my achieving my new position.

I would also like to thank Scarborough South GC for sending me to Askham Bryan College, which enabled me to become qualified, and to head greenkeeper, Colin Robinson, for passing on his knowledge to me at every opportunity.

D ROWE Golf Club Herford, West Germany

■ I was intrigued at the introduction into the UK of the Toro HydroJect 3000 ('Shot in the Dark' – June issue) and greatly admire the design of this beautifully engineered product.

I am among the first to applaud new thinking in the field of surface and sub-surface cultivation without disruption... but the article, written not unexpectedly with an American slant, compares water injection only with core-aeration and implies that this is the only conventional method of aeration.

Of course, in the USA, regular slit-tining for sub-surface cultivation does not feature in many maintenance programmes, whereas in the UK greenkeepers have for years slit-tined on a regular basis to fulfil most of the needs described. Many would refute, on this side of the Atlantic anyway, that coring is the only conventional method of aeration.

'Compaction pans' due to repeated cultivation to a uniform depth are a phenomenon more prevalent in the USA. British greenkeepers, with solid support and recommendations from consultants such as Jim Arthur, have for many years been regularly slitting at four, six, eight inches and deeper, with such as the Hydromain, to avoid such a pan developing.

The long, uncompacted hole produced by such tines have side walls of a considerable area to absorb air and moisture, promote gaseous exchange and encourage deeper root growth, all contributing to a healthier sward.

I wonder why the research in Michigan compared work on plots which had only received hollow-tine or non-cultivation? Surely on such areas any type of deep penetration would provide conclusive improvement.

Interesting also that soil strength measurements showed water injection treatment effective to a depth of four inches against hollow-tining at only two inches! When necessary we are consistently coring to four or five inches, with measurable cores on the surface to prove it. It must be difficult (or at least time consuming) to truly assess the regular penetration depth of a jet of water into a surface where degrees of compaction are variable.

I may well be accused of bias, perhaps justifiably, but it seems to me the title 'Shot in the Dark' is apt. Perhaps we need a little more light on the subject.

ARTHUR HARRISON SISIS Equipment (Macclesfield) Ltd

To David Golding, Education Officer

■ I have recently been accepted for a Greenkeeping Management course at Oaklands College and seek your help in gaining practical experience whilst progressing toward my qualifications.

I live on the Herts/Beds borders and wish to enter the greenkeeping profession. I find that without practical greenkeeping experience my college progress is hampered. Can any Club use a willing and eager extra hand?

DAVID DAY 70 Woodside Rd, Lower Woodside, Caddington, Beds LU1 4DQ

Letters

As the final cheers for Ian Baker-Finch die away, the machine-gun fire of champagne corks in the R&A and VIP hospitality marquees finally fade and the back slapping ceases, thoughts of the greenkeeping cognoscenti turn, not surprisingly, to the part played by BIGGA members in this most spectacular sporting pageant of all time.

The Open is really something special for a multitude of reasons, for just as the game could not take place without world class professionals, so also it could not take place without the care taken over so many months by a group of dedicated professionals from a different school - I refer of course to Royal Birkdale's Tom O'Brien and his team, and to a lesser, though no less important, extent to the spirited team of BIGGA greenkeepers who assisted so ably throughout the Championship. To Tom and his crew, and to all those who by their presence and hard work made the 120th Open the huge success that it was, we offer our sincere thanks. In addition, although they probably don't realise your importance in quite the way that we 'in the know' do, it is proper at this time to extend gratitude - as though it came unsolicited - from the hundreds of thousands of spectators who marvelled at the splendour of it all.

Words alone cannot tell the story of The Open, or of BIGGA's increasingly important part in it all, so let these photographs tell our happy tale of 'one week with BIGGA at The Open Championship.'



Viscount Whitelaw greets Royal Birkdale's Green Chairman, Robert Madison and Head Greenkeeper, Tom O'Brien



He made it! Bill Hatfield admires Baker-Finch's last shot



Unwelcome rainfall? No problem in official BIGGA wet weather outfits

100,000

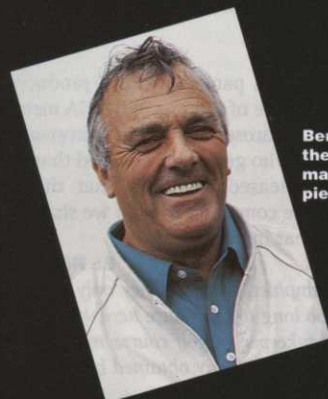


The Open will have special memories for Jim Paton, who was given the iron clubs of 1989 Open Champion, Mark Calcavecchia



Royal Birkdale's greenkeeping team

Ready for action - wet weather style



Bert Cross - the man who made the pieces fit



A time to relax - Roy Kates and Clive Osgood



Tom O'Brien and Walter Woods - two famous greenkeepers



Greenkeepers at the 18th with Ian Baker-Finch, winner of this year's Open

thank-yous



The damage...
...and the repair



Mr and Mrs George Malcolm - The Open is clearly a happy time



Birthday boy, David Golding, passes the leader board for a timely reminder of his particular score

Photographs
by
**DAVID
WHITE**

SCIENCE of the

by Dr RICHARD GIBBS

Soil science is one of those subjects that either interests people or it doesn't, yet if you think about it, most of the problems that are likely to be experienced on a golf course are related in some way with what goes on *under* the turf. Drainage, compaction, turf nutrition and irrigation are all extremely topical areas for discussion and all come under the umbrella of soil science in some form. Sand greens are promoted as the answer to all our problems of poor drainage and playing quality, yet how much detail is used to explain that these greens are also artificial creations for which the physical, chemical and biological characteristics associated with 'traditional' soils simply do not apply.

In short, I believe that many greenkeepers experience only the bad side of soil science, ie. once it has caused a problem. Unfortunately, many will be in the almost permanent position of battling against the undesirable side of soil science (eg. compaction, poor drainage, drought) simply because the increase in traffic over the last few years has put constraints on the soil that did not exist in the past. In contrast, new courses that are currently being built should be constructed with many principles of soil science firmly embedded in the specifications if the project as a whole is to succeed. Therefore the greenkeepers of these new courses theoretically should not experience the same degree of difficulty experienced by greenkeepers of many older courses. I say theoretically because this all hinges on soil science being very much part of the golf education scene.

SOILS AND CONSTRUCTION

In my time as a research scientist and soils consultant and more recently as a turfgrass and soils lecturer at Lancashire College of Agriculture and Horticulture, I am often amazed at how so many principles of soil science continue to be ignored, particularly when the whole approach to construction is tackled from a civil engineering angle. Take for example the photograph opposite. This shows a cross-section of a sand carpet construction where approximately 100mm of medium-fine sand was placed over existing topsoil which has been intensively slit drained. What you should see is a layer of medium-fine sand overlying a blinding layer of coarse sand (which there is), overlying a layer of clean gravel in the slit drain (which there isn't).

What happened was that a layer of soil (marked by the arrow) was pushed over the gravel in the slit drain during construction so that there is now no direct drainage connection. The consequence of this action was a complete failure of the system to remove surface water during the winter period, such that the whole construction had to be re-drained with new sand-gravel slits after only one season of use. This sort of example gives sand constructions (of which the picture is only one type) a bad name.

SAND AND PEAT

Another area that gives sand constructions a bad name happens nearer the surface. When using sand as a construction or maintenance medium, provided that the correct type of sand is used, it is true to assume that problems of poor drainage and aeration can be overcome. However, solving the primary problem of drainage creates other difficulties relating to water storage and nutrition. Adding an organic amendment (usually peat), which helps overcome water and nutrition shortfalls, is regularly carried out and indeed again it is true that an increase in water holding capacity is achieved in classic 'law of diminishing returns' fashion through the addition of peat to sand. However, adding peat to pure sand or even to a sand/soil mix is in my view a misguided horticultural legacy, particularly when the peat is incorporated only in the surface of the construction. Consider the origins of peat – it accumulates in cold, wet, often high up

places where anaerobic conditions prevail and organic matter decomposition is severely retarded – and yet here we are adding the material to a growing medium with no biological activity whatsoever and suddenly expecting the rootzone to drain, to provide water and nutrients, to provide an acceptable level of aeration and to absorb the impact of golfer's feet – all within a few months of being created.

What often happens to the peat is that with time it separates out into a discrete layer within the construction, becomes buried by sequential top-dressings and finally turns into an anaerobic layer impeding both drainage and aeration.

There are those who believe that if the right type of soil is mixed with an appropriate proportion of very carefully specified sand, then this mix has many physical advantages over a sand/peat mix (see Jim Arthur's comments in May 1991 issue of Greenkeeper International). I would generally agree with this view, although I do not hold the view at all that 'fen soil' is the only soil capable of providing this ideal concoction of physical properties, with the use of local top soil being virtually always out of the question for greens constructions. In my view, golf courses should attempt to reflect the nature and properties of their indigenous soils and this should not involve the huge expense of carting large quantities of soil from one end of the country to the other.

ANAEROBIC ROOTZONE

Whilst at Aberystwyth I made a study of a sand construction which had gone anaerobic due to the addition of peat as an organic amendment at the surface. The study showed that the total amount of organic matter in the peat/sand layer (0-20 mm) was very closely related to the redox* potential of the same layer. What was also particularly interesting was that it was possible to show that the amount of roots growing beneath the anaerobic zone decreased the more anaerobic the peat/sand layer became. We are generally quite accustomed to a physical barrier reducing root growth at depth, but a chemical barrier can also have serious consequences. *The lower the redox value, the more anaerobic the soil – it can even become negative.

BLACK LAYER

Furthermore, the same sort of problem can occur with time even when organic matter has not been deliberately added during the construction phase. We are very fortunate at Myerscough to possess some of the oldest constructed sand greens in the country and it is only now that some of the undesirable side effects of certain sand greens are coming to light. Many of you may have come across the dreaded black layer, something which develops particularly in sand constructions as a result of a change in the chemical nature of the rootzone. It may develop in more traditional greens as well, except perhaps we just don't see it.

What is this mysterious black layer? Originally I had assumed that it always represented an anaerobic layer of peat that had become buried by sequential top dressings. Indeed one of the conditions for a black layer to develop is that a source of organic matter must be present to act as food supply for anaerobic bacteria. However, in this particular sand green at Myerscough, which was constructed in 1980, a black layer has developed where the organic matter source comes not from peat but from a natural build-up of organic matter from decaying grass roots and stems, better known to us all as thatch (see photograph on Page 17). This build-up of thatch has occurred under anaerobic conditions for two reasons: first, the green was sown with a creeping bentgrass (a turfgrass still causing much controversy) which is well known to be a voracious thatch producer and it has not been particularly well controlled on this green over the years; second, this sand green is a classic example of where the principles of soil science have been ignored – not, I hasten to add, through the fault of the college staff, but because the manufacturers of this particular system (for which there is a patent) insisted on a certain type of sand, which by today's standards would be totally inappropriate. The result of using this sand has been that the

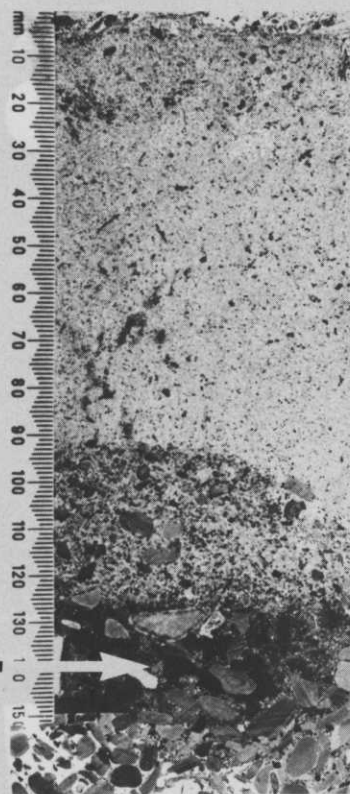


Figure 1: A cross section of a poorly built sand carpet construction. Soil has been pushed over clean gravel in a slit drain beneath the sand carpet (see arrow) destroying the vital drainage connection of the slit drain with the sand carpet

SOIL



A black layer in a pure sand green. This layer has developed because conditions in the green are anaerobic for long periods, due to inappropriate choice of sand and deficiencies in maintenance. This is formed by metallic sulphides (e.g. iron sulphide) which are created under intensely anaerobic conditions by sulphur-reducing bacteria. These intense anaerobic conditions are sufficient to kill turfgrass roots

green continues to hold water in the rootzone despite allowing water to pass freely into the drains.

BLACK LAYER CHEMISTRY

With the help of Dr Bill Adams of the Soil Science Unit, University College of Wales, I have been very interested in examining the chemical nature of the black layer. His preliminary tests have given quite startling results – the black layer has a pH of two units lower than the pH of the original sand and iron sulphide is present, which gives the layer its colour (see below). Iron sulphide is formed from hydrogen sulphide, which is a gas produced under severe and prolonged

anaerobic (reducing) conditions and which is toxic to turfgrass roots. No wonder all the sand falls out when the hole is changed – there are no roots to bind the sand together below a depth of 50mm!

In fact, under these anaerobic conditions much of the iron is present in its reduced ferrous state and this reacts with the hydrogen sulphide to form the black ferrous sulphide. Ferrous iron (which is highly mobile in the soil) can be oxidised fairly easily to ferric hydroxide (essentially rust) which has precipitated out immediately below the black layer where conditions are more aerobic and where there is no concentrated organic matter source for anaerobic conditions to develop. It is quite common to find a thin film of ferric hydroxide lining the holes created by hollow tine corers, since these holes are point sources where air has been introduced into the rootzone. This whole sequence of events, which I have described in very simplistic form, is a process which occurs as a natural part of soil development in wet or marshy soils and is well known to soil scientists. What is interesting is that we have seen the same process occur in a very short time in a constructed soil profile.

DEVELOPMENT OF BLACK LAYER

One reason why the black layer may have developed so quickly may be due to the regular use of ammonium sulphate and iron sulphate, both of which are acidifying fertilisers and which favour chemical reduction in anaerobic soils, in addition to providing sources of soluble iron and sulphur. We need further evidence of the importance of these sources. Certainly, detrimental consequences are not inevitable with their use and at the moment I would not hesitate to continue using both types of fertiliser.

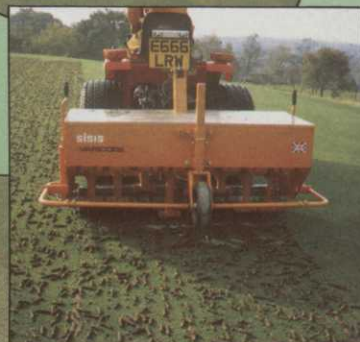
To summarise, there is a complex chemistry occurring beneath the surface of golf greens, including some which we consider to represent the ideal free-draining growing medium. Development of the black layer is an extreme example of deterioration brought about through lack of adequate mechanical maintenance to improve aeration and prevent accumulation of organic residues. Problems in maintenance are often – as at Myerscough – compounded by errors in design specifications. Finally, I would finish by stressing that soil science is important to the greenkeeper and you are in the extremely fortunate and rare position of regularly being able to inspect the soil in your greens every time you change a hole – something which happens in no other sport. Make the most of this opportunity.

● The author, Dr Richard Gibbs, is a Senior Lecturer in Turf and Soil Science at Lancashire College of Agriculture and Horticulture. He acknowledges with gratitude the provision of analytical data on black layer by Dr Bill Adams and the assistance with redox and peat measurements from Dr David Lance of Land Use Consultants, Devon.

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Doffing of the cloth cap wasn't for Duncan McGilvray. When he joined Letchworth, he brought with him a 15-point management plan, as DAVID WHITE reports

The First Garden City – Letchworth – was and is the most successful township “planned to ensure the health and happiness, dignity and freedom of its inhabitants.” Unquestionably, it still remains the very best of such ‘dream’ concepts and a near perfect model to this day for civilised town dwellers the world over.

That the good burghers of Letchworth saw old Ebenezer Howard’s vision through to reality is clear at every turn – it really is a bonny place – as also are the results of some pretty clear thinking that began perhaps even before the first dream houses were built in 1904. In that year the professional from West Herts Golf Club, Alfred Tingey, was commissioned to design nine holes on what was then the Manor Park of Letchworth Hall, with a year or so later a somewhat rough and ready course opened for play. Like many such unsophisticated courses of that era, it served an initial purpose and was okay in its way, though according to their first professional, Bert Ashby, who seemingly doubled as a greenkeeper, “the greens were hardly bigger than the tees, the fairways were narrow tracks covered with weeds, and nettles abounded in the rough”.

At some point in 1909, ‘having regard for future development of the course’, £10 was set aside to look into the prospect of planning an extended course and the six times victor of The Open Championship, the near-invincible Harry Vardon, was invited to look the place over. His ‘thumbs-up’ opinion was followed by his own detailed architectural

Call it.

plans to re-design the existing nine and further extend the park to 18 holes – at a cost of £500 – and although the Club only had £64 in the bank, somehow the funds were found and the course laid out to Vardon’s specifications, remaining much the same as Harry saw it to this day.

Those who hold office at the Club seem to have been astute in many of their decisions, not least their choice of head greenkeepers, for in 86 years just six men have held the post, the last and present incumbent being Duncan McGilvray, a young Scot who joined them nearly four years ago.

To learn more of the course and the man, I took time out to play a round with Duncan, taking in the delights of real parkland golf whilst listening to him and absorbing many of his thoughts and ideas. “How was it”, I asked, “that a man celebrating his 38th birthday this very day, comes to be Course Manager of one of Hertfordshire’s most prestigious courses – what path did you take?”

Like many a young Scot before him, Duncan took to greenkeeping straight from school, guided by some of the very best head greenkeepers whilst gaining theoretic knowledge through college tuition. For ten years he remained in or around his birthplace of Edinburgh before moving south to England, where he took work as a head greenkeeper, first for three years on the seaside links of Great Yarmouth and Caister before moving inland to Bramall Park in Cheshire for six years and, just under four years ago, to Letchworth. He was hired as course manager from the start, inheriting a situation which the Club saw as being ‘an awful lot of problems on the course’ and which no one on committee had the skill or knowledge to effectively oversee. A man to manage totally was their brief. The idea of an old style doffing of the cloth cap and grubby overalls image was not part of Duncan’s make-up and he straightaway presented the Club with a 15 point management plan – culled over many years – which clearly impressed both the committee and John Campbell, who sat in at his initial interview.

Just as Duncan was impressed by the Club, who had made a radical decision about that time to dispense with a green committee, so were they impressed with him. They needed someone to take total control and they saw him as their man. There is just one committee member with whom Duncan negotiates, a green convener or course liaison officer, who having spent one year under the previous convener, learning the ropes so to speak, will hold office for five years. He reports to the management committee on course matters, but as Duncan was pleased to point out, no policy decision made previously can be changed. Committees come and go but policy once decided continues, and Duncan’s number one point of his 15 point plan was to take an active

TEAMWORK

role in the formulation of such policy.

From the very onset the Club was behind him all the way, with a committee stalwart, Brian Hodder, arranging for the local 'Citizen' newspaper to print photos of Duncan and his course and introduce him to the golfing community. Soon a Club newsletter featured the new incumbent and within his first year he presented a detailed course discussion evening – now an annual feature – in which he presented to over 200 members his thinking behind course planning and maintenance. Duncan smiled as he recalled the title of that first talk, "The Way Forward", which can now rightfully be seen as the forerunner of the R&A document which was launched in 1989. Did they, one wonders, hear of the Letchworth initiative beforehand?

Talking of the course, his first and main aim was to reclaim indigenous grasses and eradicate thatch and *Poa annua*, whilst at the same time managing the course in such a way as to not alienate either his members or visitors while the change was taking place. Judging by the deliciously true hand-mown greens, he's winning that particular war and his members must be well pleased. His other primary aim, an admirable one, is to protect the environment and to that end he is a founder member of the School of Minimal Use of Pesticides and Herbicides. He's a confirmed admirer of Jim Arthur and believes in his doctrines.

"What are you most proud of?" I asked, and without hesitation he cited the achievements attained with his team. 'We've gone from their working in often confused and opposing directions into a tight and highly motivated group, spending over 70 per cent of our working time actually on the playing surfaces and with each man knowing full well the reasons behind every move we take. I've brought them forward to a point where if anything should happen to me my second in command could take over and each man could move up a place. The Club would not be in a panic situation, something that isn't always the case at some Clubs I could mention, and I claim training as the reason, the effective management of people'.

I was equally impressed to find work well under way on an independent water source – a borehole – which is part of the long-term management plan and nearing completion. The borehole is 185 feet deep and is being installed with an assured yield test of 5,000 gallons an hour, far more than the Club will ever need but nevertheless guaranteeing them a tested and no doubt comforting water source for the

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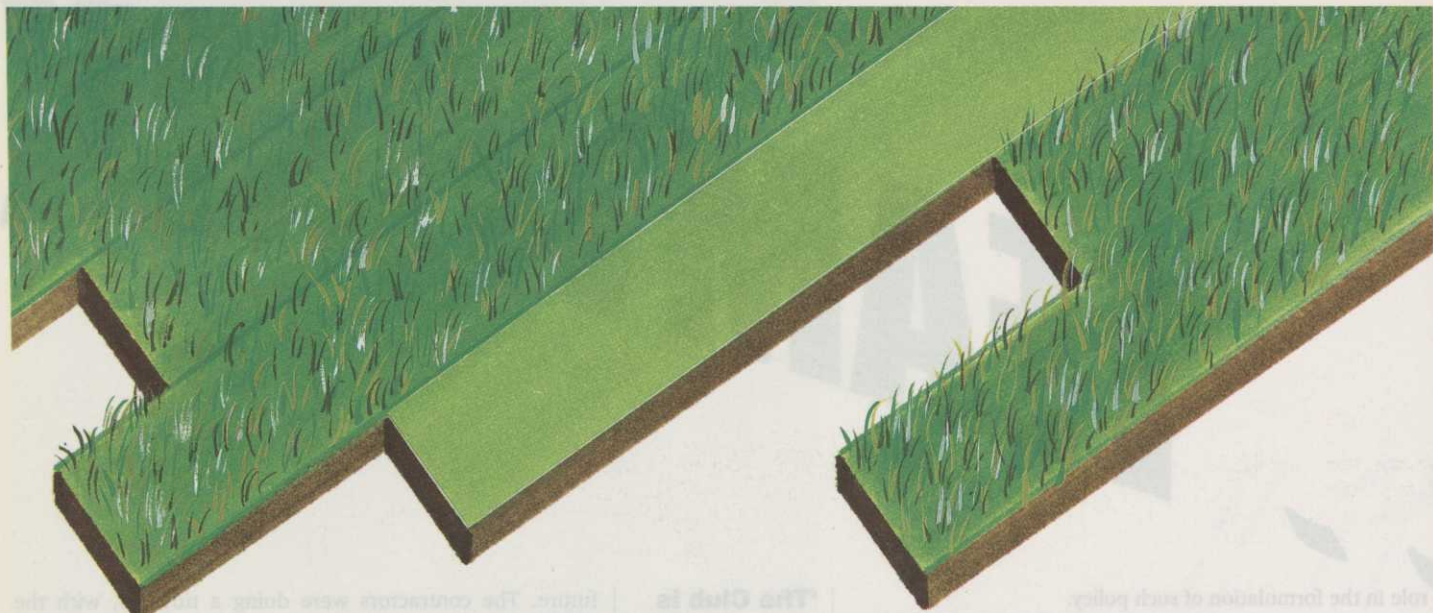
future. The contractors were doing a tidy job, with the accent yet again on minimal disturbance to players. Duncan's throwaway line – "all down to forward planning some three years ago" – appeared matter of fact, almost casual, – but I sensed nevertheless an unrestrained feeling of pride in his comment.

Duncan is a keen golfer and succeeded in taking me to the cleaners for a modest wager, his belief being that without access and knowledge of the game – especially on home territory – it was less than easy to discuss any finer points of the course. Having finished our round I warmed still further to this very likeable personality when he confided in me that he held his employers in high regard. 'The Club is not run as a business', he asserted, 'but it is run in a totally business-like manner, and I'm proud to play a part in that business team'. I formed the view that his Club might well share that same pride in him.



Above: The ninth fairway, with Letchworth Hall, now an hotel, in the background

Left: Attention to one of the 74 bunkers



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