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Fall 1977

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TURF BULLETIN

MASSACHUSETTS TURF
AND LAWN GRASS COUNCIL
I N C O R P O R A T E D

Featured in this issue:
Municipal Golf
Nitrogen Overview
Ideal Par 3



FALL 1977

BETTER TURF THROUGH RESEARCH AND EDUCATION

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Fall 1977

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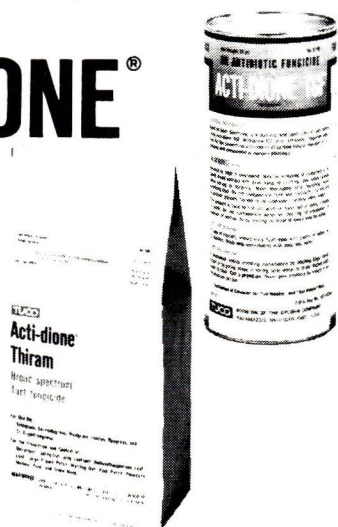
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The Massachusetts Turf and Lawn Grass Council Incorporated is chartered under the laws of the Commonwealth of Massachusetts as a non-profit corporation. The turf council seeks to foster "Better turf through research and education."

More detailed information on the subjects discussed here can be found in bulletins and circulars or may be had through correspondence with the editor.

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University of Massachusetts Turfgrass Conference And Industrial Show

The first Industrial Show in conjunction with the University of Massachusetts 47th Annual Fine Turfgrass Conference was held March 2, 3, and 4th at the Springfield Civic Center.

The conference and show is co-sponsored by the University of Massachusetts Extension Service, the Massachusetts Turf and Lawngrass Council, and the Golf Course Superintendents Association of New England.

There were more than 58 firms exhibiting all types of turf products in 105 booths. Conference attendance including Golf Course Superintendents, Landscape Contractors, Park Superintendents, Cemetery Superintendents, etc., and exhibitors was well over 1,300.

The educational talks were well attended. The speakers were outstanding and they represented a wide spectrum in background ranging from golf and cemetery superintendents to Industry and University turf specialists.

The banquet was also well attended with 350 people enjoying every line offered by the main speaker, Mr. Angelo Bertoni.

The Conference and Industrial show will again be held in the Springfield Civic Center on February 28, March 1 and 2, 1978.

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Municipal Golf Courses Can be Profitable

By Edwin B. Seay

President, American Society of Golf Course Architects

The idea that public golf courses can turn a profit is not as far fetched as it sounds. In fact, numerous municipal courses around the country pay their own way, and some even contribute to other parks and recreation programs in their district. The secret is to design a course to be profitable, then operate it that way. The right blend of land, design, construction and financing can lead to money-making public courses.

Most municipal courses are financed through the sale of general obligation bonds. These must be approved by voters in a referendum, and the taxing body is ultimately responsible for payment of principal and interest. Some municipalities, however, are able to budget construction of a course via two or three annual appropriations. Fur-

ther, state and federal grants (often matching grants) may be obtained for local recreation programs.

Land is sometimes a major cost element of a golf course. But judicious selection of property can lessen or even eliminate this line item. As an example, federal government properties are sometimes declared surplus, then made available to local taxing bodies for use as parklands. A former Nike Missile Base in Arlington Heights, Illinois, was turned into a pleasant 90-acre golf course. First, the missile silos had to be filled in, and then artificial lakes and ponds were created. But in the end, a beautiful course was built on no-charge land.

Land for Ives Groves Golf Links outside Racine, Wisconsin, was acquired through a grant from the State of Wisconsin Outdoor Recreation Program. This 191-acre championship course serves the people of Racine County with reasonably priced golfing.

Completely irrigated, the 18-hole course was opened in 1971 at a cost of \$1.1 million. Three annual appropriations covered: Land, \$135,000; well, \$50,000; clubhouse, \$200,000; construction, \$500,000; service building, \$60,000; and other, \$155,000. A State of Wisconsin Outdoor Recreation Program grant for \$135,000 went toward land acquisition. No federal money and no bonding issue were required.

Fees are set to cover annual operating expenses of \$220,000. Last year, 60,000 rounds were played at a 9-hole resident charge of \$2.50 (weekday) and \$2.75 (weekend). Eighteen-hole costs are \$4.75 and \$5.25, respectively. Annual fees are \$100 for adults and \$45 for junior and senior citizens.

The federal Bureau of Outdoor Recreation makes matching grants to states and through them to municipalities for the planning, acquisition and development of public recreation areas, including golf courses. States that develop comprehensive outdoor recreation programs are eligible to apply for these 50-50 matching grants.

The Farmers Home Administration Loan Program can make loans to develop community facilities for public use in rural areas and municipalities of up to 10,000 people. Repayments stretching 40 years are possible.

Unique Course

Glen Ellyn, Illinois built an innovative, championship 18-hole course within and around a much-needed storm water retention system. A \$1.5 million general obligation bond issue was approved by voters in Glen Ellyn and neigh-



Glen Ellyn, Illinois provides residents 18 and 9-hole golf courses which are self supporting. Income even finances maintenance of five nearby athletic fields.

(Continued on Page 4)

(Continued from Page 3)

boring communities in 1967 to convert a dangerous flood plain into a retention basin network.

When the system was complete, these suburbs were not only safe from flooding, but had a gently rolling, 237-acre golf course. Eighteen retention ponds are now part of the Village Links of Glen Ellyn along with 150 sand traps, bent tees and a modest clubhouse which brings more than 75,000 golfers per year. Money to add a 9-hole course, and five athletic fields came from a \$210,000 revenue bond issue a few years later.

The 27-hole Village Links of Glen Ellyn will attract 75,000 rounds of golf this year. Fees are pegged to cover the costs of operation, plus amortization on the \$210,000 revenue bond issue. Residents pay \$5.50 per weekday play and \$6.50 on weekends. Non-residents are charged \$7 for weekdays and \$8.50 for weekends. No recreation tax is needed, and the course is considered a financial success.

Kansas City, Kansas, provides another example of creative financing. The Sunflower Hills Golf Course in Bonner Springs (suburban Kansas City) is a partnership between five levels of government. A federal grant of \$376,322 from the Bureau of Outdoor Recreation, Land and Water Conservation Fund was matched by the State of Kansas. The Wyandotte County Park Board donated the land, and also absorbed water and power costs. The City of Kansas City, Kansas, provided most of the remaining funding, and the City of Bonner Springs also contributed.

This combination permitted a \$1 million championship golf course to be built "paid-in-full." No bonds had to be floated and no principal or interest was payable. Plans exist for expanding the course to its full \$1.25 million potential at some future date.

Sunflower Hills is the first municipal course serving

greater Kansas City. Its 18 holes, clubhouse and maintenance building will open next spring. Four tees per hold and a completely automatic watering system are included. The land was formerly a county park, containing diversified and beautiful terrain. Every type of setting is present, including steep hills, flat and wooded land, five ponds and many sand traps. The course is adjacent to an expressway interchange, providing access for the county's golfers.

With course construction paid for, profit will come from the anticipated 40,000 to 45,000 rounds of golf expected each year. Weekday greens fees are pegged at \$4.50, with special rates for groups and full seasons. Sunflower Hills expects to be a revenue-producing facility (especially after the first year), with profits paying for Kansas City's contribution as well as other community recreation programs.

As with Sunflower Hills, competent design is essential to successful operation. A well-planned course will take advantage of terrain, contours and water flows to greatly reduce construction costs and limit earth-moving. The course will also be designed with lower maintenance costs in mind. Mowing, watering, tee and pin positions and other factors will be planned to minimize operating expenses. Finally, a professionally-designed course will invite golfers. Profitability comes from maximizing revenues, and attractive challenging courses generate those revenues.

Courses built several years ago were established in the pre-inflation world of land, construction and operating costs. It may be necessary to settle for less-than-prime land today, or to look harder for federal or state grants. Some municipalities have even been fortunate enough to receive land bequests. But creative planning and land acquisition today can lead to a first-class municipal course that doesn't break the public bank.

One such success story is the Cranberry Valley Golf Course in Harwich, Massachusetts, on Cape Cod. This 18-

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hole, full-size, championship course is the envy of the Cape, attracting 50,000 rounds in 1976. The two-year-old course ranges from 5,500 yards (ladies' tees) to 6,900 yards (championship tees), with two other tee locations in between. Greens are exceptionally large, averaging 12,000 square feet. Originally a sandy property, Cranberry Valley is now lush and beautifully landscaped with gently rolling terrain and three water holes.

Residents from Harwich (7,000 population in winter, 70,000 in summer) flock to the course, as do other neighbors and tourists to the Cape. Based on \$8 green fees and \$135 per person memberships (with lower rates for fami-

lies), the course made \$30,000 profit in 1975 and anticipates \$65,000 to \$80,000 excess in 1976. Annual principal and interest payments of \$71,000 are covered, as is the \$165,000 operating budget. The Town of Harwich has a beautiful course and is pleased with the operation and financing of this \$775,000 facility.

The nation is seriously short of public golf courses. About 42 percent of the country's golfers play on 13 percent of the country's courses. But, with skillful design and operation, municipal courses can pay for themselves while a community realizes the benefits of an attractive course and a profitable operation.



Once largely sand, Cranberry Valley Golf Course has become one of Cape Cod's finest municipal layouts.

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An Overview of Nitrogen on Turfgrasses With Emphasis on Its Effects

By Brian M. Silva

University Of Massachusetts, Amherst

Nitrogen is the most abundant element in the atmosphere, constituting approximately four-fifths of the air around us. There are nearly twelve pounds of nitrogen above every square foot of the earth's surface. Nitrogen is one of the most critical elements for plant growth, and in spite of its abundance often the limiting element in the growth of agricultural crops. This is due to the fact that the atmospheric form of nitrogen is unavailable to most plants with the exception of nitrogen-fixing bacteria and algae (6, 8).

Nitrogen is a constituent of all living cells; each chlorophyll molecule, the green pigment essential for the carbohydrate-producing process of photosynthesis, contains four atoms of nitrogen placed around a central magnesium atom. Nitrogen is also a major structural component of proteins, amino acids, nucleic acids, ATP and most enzymes. (3).

If it were necessary to choose one fertilizer element more essential than others for the growth and development of turfgrasses, the vote would certainly have to go to nitrogen. Compounds containing nitrogen comprise from forty to fifty percent of the dry matter protoplasm which is the living and self-producing substance of plant cells. Thus, nitrogen is an indispensable component of proteins, chlorophyll, amino acids, amides and alkaloids (6).

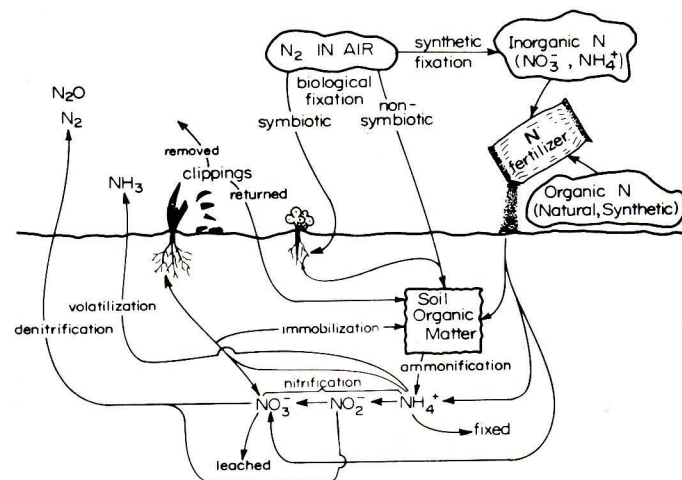
Nitrogen seems to have by far the quickest and most pronounced effect of any of the macronutrients. An application of this element will make plants darker green in color and encourage above ground vegetative growth. In reference to the turfgrasses, this additional topgrowth will be accompanied by a corresponding increase in root growth as nitrogen levels are raised. However, this relationship doesn't continue indefinitely because as nitrogen levels are increased a point is reached where the quantity of carbohydrates available for protein synthesis becomes limiting and this causes a suppression of root growth. The topgrowth retains priority for plant-produced carbohydrates in turf, and excess stimulation of shoot growth by high nitrogen levels can cause a die-back of roots due to a lack of carbohydrates for the maintenance of existing roots. This restriction on the depth and extent of the root system decreases nutrient and water uptake and increases the plant's susceptibility to injuries such as desiccation and high temperature injury (4, 5).

Nitrogen increases cell size and thins cell walls, thereby creating a more succulent plant. In addition, nitrogen increases the proportion of water retained by the plant. Research has shown that many crops which have been fertilized with nitrogen exhibit an increased ability to absorb not only more nitrogen but also more phosphorus, potassium, and calcium. Nitrogen fertilization increases the ca-

tion exchange capacity of the plant roots and thus makes them more efficient in their ability to absorb other nutrient ions (5, 6).

NITROGEN TRANSFORMATIONS

The nitrogen cycle traces the various reactions involved when nitrogen enters a biological environment: its use by organisms, its release when the decomposition of dead organisms takes place, and its conversion to its original forms. The illustration below offers a simplified view of the nitrogen cycle as it would apply to turfgrass areas (7):



At any one time the great bulk of nitrogen exists in the soil in the form of organic compounds protected from loss and largely unavailable to uptake by plants. The organic nitrogen in the soil is assumed to be largely protein or peptide. An average minimum of some thirty percent of the nitrogen has been found to be proteinaceous in form, while at least half of the remaining nitrogen is held in a form quite strongly resistant to the process of hydrolysis and is considered to be part of the molecules of which it is found, chiefly the derivatives of lignin. The organic nitrogen that remains includes substances such as chitin which are resistant to chemical attack or decay, and a great many minor nitrogenous compounds (3).

Only about two to three percent of this immobilized nitrogen is mineralized annually. The organic nitrogen compounds are attacked by a diverse population which includes bacteria, fungi, and actinomycetes; the more complex proteins and allied compounds are simplified and hydrolyzed with the end product being nitrogen in the form of ammonia. This process will occur under a wide range of environmental conditions but is favored by moist condi-

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tions, good soil aeration, a soil reaction close to neutral, freedom from toxic substances, and a favorable carbon-nitrogen ratio. A carbon-nitrogen ratio of 25:1 to 30:1 is usually most favorable for the decomposing organisms (2, 5, 7).

The ammoniacal forms of nitrogen are subject to a number of possible fates. They can be fixed in an unavailable form in the lattice of certain expanding-type clay minerals such as vermiculite, illite, and montmorillonite; they can be appropriated by organisms such as Mycorrhizal fungi which in turn pass them on to their host; or they can be taken up by higher plants or converted into nitrites and nitrates by the process of nitrification.

This conversion involves the biological oxidation of ammonium to nitrate and normally occurs in two coordinated steps. These steps are brought about by special purpose bacteria; *Nitrosomonas*, which is important in the conversion of ammonia to nitrites, and *Nitrobacter*, which oxidizes nitrites into nitrates. Both of these bacteria are classified as obligate chemautotrophs, a chemautotroph being an organism which obtains energy for its growth from the oxidation of inorganic compounds and uses carbon dioxide as a source of carbon. The nitrite is usually oxidized as rapidly as it is formed and it is rarely given the opportunity to accumulate to toxic levels. A possible exception to this situation would occur under very alkaline soil conditions (5, 10).

The bacteria which aid in the process of nitrification are extremely sensitive to their environment, hence soil

conditions such as the presence of proteins to form ammonia, the presence of ammonia salts, adequate aeration, moist but not wet soils, and large amounts of available calcium will favor the growth of the nitrifying bacteria and the vigor of nitrification (1, 6).

This form of nitrogen also faces a number of possible fates once it is in the form of nitrates. The nitrates can be utilized by plants, immobilized by soil microbes, lost by leaching in drainage, or lost in a gaseous state. Denitrification is the biological reduction of nitrate and nitrite to gaseous nitrogen, usually in the form of nitrous oxide and molecular nitrogen.

Nitrogen may also be lost from the soil by volatilization of ammonia. Under optimum conditions as much as 25 percent of the ammonium applied or microbiologically produced may be lost in the form of ammonia. Volatilization of ammonia is favored by alkaline soils, warm temperatures, low cation exchange capacity and low soil moisture. Research with applications of urea on Kentucky bluegrass sod has produced losses of gaseous ammonia of close to 30 percent eight to ten days after fertilizer application. Adequate drainage, dense cover of turf or crops, and the avoidance of excessive nitrogen fertilizer applications will greatly help in reducing the loss of nitrogen in this manner (7).

NITROGEN FIXATION

Certain free-living bacteria and blue-green algae are capable of fixing atmospheric nitrogen. In ancient Greece

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it was realized that legumes had a beneficial effect upon the crops which followed in their places. This fact was also mentioned in several instances in the Bible. It wasn't until the late 1830's that Boussingault demonstrated that this beneficial effect of legumes was due to their ability to fix atmospheric nitrogen (6).

Symbiotic fixation of nitrogen is brought about by bacteria which live in association with plants. Symbiotic bacteria attack the root hair of leguminous plants and this injury causes root cells to grow around these bacteria. The roots of the plant supply the essential minerals and organic matter for energy and in return the bacteria are able to use atmospheric nitrogen to build their body proteins. Symbiotic bacteria belong to the genus *Rhizobium*, and several species are named after their host legume. Factors which limit symbiotic fixation of nitrogen are low soil reaction, high temperatures, excess moisture, presence of available nitrogen compounds, and low levels of calcium, potassium, phosphorus, and other essential elements (2, 6).

There also can exist micro-organisms which fix elemental nitrogen from the soil air into their body tissue without plant association; this is termed non-symbiotic fixation. In 1891 Winogradsky demonstrated that when soil was exposed to the atmosphere its content of nitrogen increased. An anaerobic bacterium, *Clostridium pasteurianum*, was responsible for the fixation of elemental nitrogen without the aid of a symbiotic relationship, Beyerinck, in 1901, isolated an aerobic bacterium, *Azotobacter chroococcum*, which was also capable of non-symbiotic fixation. Research has shown that non-symbiotic fixation can account for between twenty to one hundred pounds of nitrogen per acre annually. Nitrogen fixation also occurs in the free atmosphere due to electrical discharges (6, 7).

DEFICIENCY SYMPTOMS

Under conditions of nitrogen deficiency plants exhibit a stunted growth habit—smaller leaves, thin stems and less lateral growth. In turf there is a stunting of shoot growth including decreased tillering and leaf length. Certain nitrogen compounds are mobile in plants and move readily from older plant parts to the growing point. This explains why the older leaves first show symptoms and often mature quicker and die prematurely under a condition of nitrogen deficiency.

Initial visual symptoms on the turfgrasses appear on the older leaves as a pale green color that changes to yellow as the deficiency symptoms progress toward the leaf base. If the deficiency persists, shoot density decreases substantially and individual plants become weak and spindly. As the symptoms progress chlorophyll is unable to block out the other pigments and a copper color develops at the tip of the older leaves and moves down the leaf in a horizontal pattern (4, 9).

EXCESS NITROGEN

Excess nitrogen is often a greater problem than nitrogen deficiency on intensively cultured turf such as golf greens and fairways. The degree of tissue hydration is directly correlated to the nitrogen level. A turfgrass plant

grown under conditions of excess nitrogen contains a higher proportion of water and has thinner cell walls. Excess nitrogen yields a succulent plant more susceptible to diseases such as *Helminthosporium* leaf spot, brown patch, *Fusarium* blight and *Ophiobolus* patch. A turf grown under succulent conditions possesses decreased high and low temperature hardiness, is more prone to winter desiccation, and will be less able to withstand traffic and wear (4, 7, 9).

The composition of a turfgrass community is influenced by the level of nitrogen nutrition. For example, in a Kentucky bluegrass—Red fescue community the bluegrass would dominate at high nitrogen levels and the fescue at minimal nitrogen levels. Also, problem weeds such as crabgrass and Annual bluegrass are often non-existent under moderate nitrogen levels but encroach rapidly at high nitrogen levels (4, 9).

The uptake of nitrogen by turfgrasses, as well as other crops, is quite rapid. Nitrates taken up by the roots can be translocated to the leaf tissue within fifteen hours. The solubility of nitrogen carriers is considered of major importance by turfgrass managers. The ideal carrier of nitrogen would release this nutrient over a long period of time as the plant requires it for growth. Unfortunately, this ideal is very seldom reached, for the breakdown of nitrogen carriers is not always constant. Such is the case with the natural organics and ureaform whose breakdown is strongly

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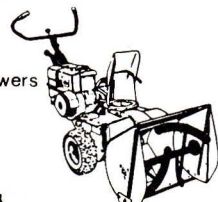
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influenced by temperature, soil moisture, and chemical characteristics of the soil.

Natural organics were virtually the sole source of nitrogen in the United States until the nitrate deposits in Chile were developed. It wasn't until the 1870's that the annual import level of nitrogen reached one thousand tons. From around 1910 and through World War II ammonium sulfate was an important source of fertilizer nitrogen. Today the main source of nitrogen is the synthetic form produced from elemental nitrogen (7).

Principal carriers of nitrogen now used in this country are anhydrous ammonia, mixed fertilizers, ammonium nitrate, and nitrogen solutions. Natural organics account for less than one percent of the total nitrogen consumption but are quite important as a specialty fertilizer for turf.

The contemporary turf manager must integrate his use of the various nitrogen carriers: the synthetic organics, the natural organics, and the synthetic inorganics. Keeping in mind each carrier's solubility, initial plant response, foliar burn potential, temperature dependence for availability, residual response, cost per unit of nitrogen, leaching loss, and the like, a manager must decide on what carrier to use, in what amount to use it, and when to apply it to maintain the steady feeding required by the growth of the plant and avoid periods of nitrogen deficiency and excessive nitrogen availability.

SUMMARY

As stated earlier, nitrogen is the most abundant element in the atmosphere. Nitrogen is required in large amounts by most crops; turfgrasses are no exception in this regard. However, while nitrogen may well be the element most often deficient in the production of agricultural crops, it is undoubtedly the one most frequently abused through

excessive use in the maintenance of fine turfgrasses on the golf course level.

With the impending nitrogen fertilizer shortages a re-education of turfgrass managers, along with all other nitrogen fertilizer users, and a re-evaluation of the nitrogen requirements of each turfgrass cultivar and agricultural crop, must be pursued so that this valuable macronutrient will be available in sufficient quantities and at reasonable prices to attain its undeniable primary goal: to assist in the production of enough food to feed the hungry of the world.

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The Ideal Par 3 Hole

Some golf course architects describe and illustrate their dream one-shotter.

Of the three broad types of holes found on the standard golf course,—the par 3s, par 4s and par 5s—the par 3 has a particular fascination in the architectural scheme of things. It can seem to be the easiest, and yet turn out to be the most demanding.

Certainly some of the more well-known par 3s are the most scenic of all golf holes—the 16th at Cypress Point and the seventh at Pebble Beach are two of the best examples. Strategically they can be the most expertly conceived. Take, for instance, the fourth hole at the National Golf Links of America, an adaptation of the more famous Redan at North Berwick, in Scotland, with its deep bunker to the left and only a salient of the green pointing toward the tee. Or take the 11th at St. Andrews, with the River Eden flowing close by the green.

The appeal of par 3 holes is created by a number of factors. First among these is distance. A golfer does not have to be able to hit the ball tremendous distances to do well. Most one-shotters require an iron off the tee for even the shortest hitters. On all but the longest par 3s, all golfers have a chance to reach the green in regulation, and even when the tee-to-green distance is too great for the short hitter, he often still can make par with a good chip and one putt.

A second source of appeal is the required precision. Since distance is not a primary concern, golfers can pay more attention to accuracy, whose reward on a well-designed par 3 is a good chance at a birdie. To earn that birdie chance, golfers often must negotiate hazards and

obstacles, such as water, bunkers or mounds guarding the green, and more specifically, often guarding that portion of the green where the hole is located.

"Par 3 holes are the only occasions where players are required to hit their approach shots to a green from the same general area and under the same general conditions," says architect William Howard Neff. As a result, on most par 3s the golfer with the most accuracy and fitness, not the one with the most power, reaps the greater reward.

Third, a par 3 can have a very strong aesthetic appeal. Since the entire hole usually can be seen from the tee, par 3s have a visual unity that is not as common to par 4s or par 5s, which are much longer and often bend right or left. This unity on par 3s can be enhanced further by the surrounding natural elements. One-shotters lined by trees, rolling terrain, sand or water become arenas in which the golfer is playing. Other times, natural elements, while not physically isolating the hole from others on the course, give it a spectacular quality. As stated before, the most famous par 3s in the United States are also among the most striking visually because of the way they incorporate natural elements or memorable hazards in their design. Examples include the aforementioned 16th at Cypress Point, with its dramatic carry across an inlet of the Pacific Ocean; the aforementioned seventh and the 17th at Pebble Beach, with bunkers surrounding both greens and the waters of Carmel Bay crashing menacingly on the rocks behind; the third at

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Olympic, with its view from the tee of the hills of San Francisco and the towers of the Golden Gate Bridge over the trees behind the green; the fourth at Baltusrol, with a large pond abutting the front of the green along its entire width; and the 12th and 16th at Augusta National, with their dazzling but dangerous combinations of water and sand.

All these elements make par 3 holes both challenging and fun. It is the par 3, more than any other hole, that comes closest to neutralizing the differences in ability among golfers. "The uniqueness of a par 3 hole," says architect Gerald Matthews, "is that it equalizes long and short hitters, high and low handicappers, duffers and pros. Virtually everyone has a chance, in one shot, to put the ball on the green, or even to accomplish the ultimate in golf, a hole-in-one."

GOLF JOURNAL asked members of the American Society of Golf Course Architects to describe and illustrate their ideal par 3 hole. A selection of their responses follows, accompanied by their illustrations.

George W. Cobb, Greenville, S.C.

"The ideal par 3 should be flexible in length, 130-230 yards, with a demanding carry but with an alternate route for the high handicap player. If design capability can afford it, the par 3s should be holes 3, 7, 12 and 16."

Geoffrey S. Cornish, Amherst, Mass.

"There should be variety in lengths of the par 3s. Length might vary so as to call for a short iron and on the other extreme a full wood. At least one of the par 3s should be memorable and photogenic. Hopefully one par 3 calls for a drop shot, but this is not always possible. Uphill par 3s are seldom truly great but are sometimes needed to get the player through a climb without undue exertion.

"My favorite par 3 concept is the Redan. This hole, the 15th at North Berwick in Scotland (see illustration), is perhaps the most widely copied one-shotter. Copies often involve modifications to a greater or lesser degree. The Red-

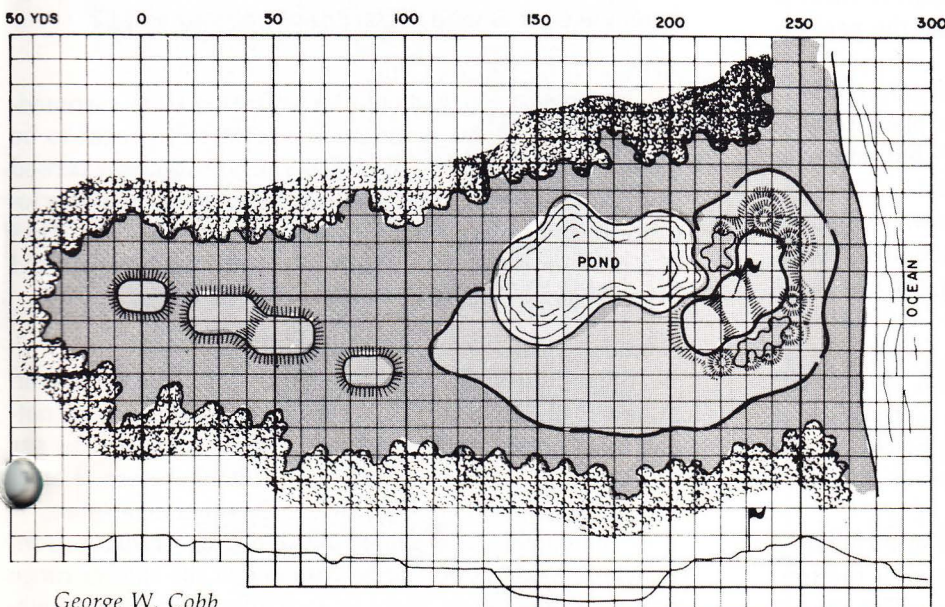
an concept includes a frightening hazard guarding one side of the putting surface. Playing for the flagstick, one is forced to carry this hazard with its awesome penalty, while the more prudent soul plays for the unguarded part of the putting surface. He then has a very long putt. At North Berwick this is slightly downhill. On the 17th at Pebble Beach (see illustration) it involves putting up a steep terrace slope. (Incidentally, I don't know for sure that Jack Neville, the designer of Pebble Beach, was copying the Redan, but it's a pretty good bet he was. Certainly he used its concept in modified form.)

"The hazard could be water or even long rough, and there could be other modifications to the putting surface. Whatever the modification, these Redan-type holes offer the ultimate in strategy in that the player who takes a big chance and is successful receives a reward. It is my ideal par 3."

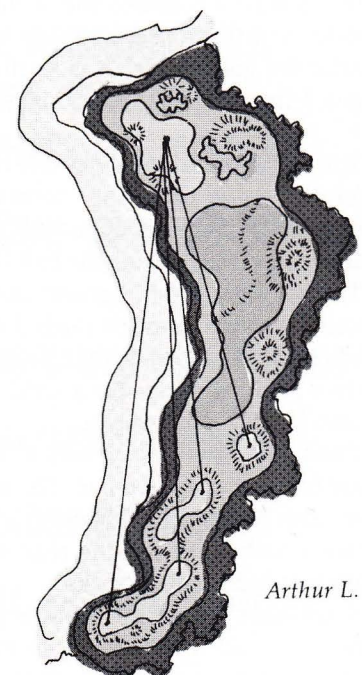
Arthur L. Davis, Rome, Ga.

"In isolation, the ideal par 3 should be 150-200 yards long with a green size of 6,000-6,500 square feet. There should be three hole locations of varying degrees of difficulty and length from the tee. A pond or lake should extend along the left side with the green protruding into it. Bunkers on the right rear and/or the right approach would demand accuracy from the tee, but there should be plenty of open fairway on the right side for high handicappers. Tee flexibility should be adjustable for length and hole location. On an 18-hole course, par 3s should be either the 16th or 17th on the second nine and in the last three or four holes of the first nine, providing an opportunity to gain or lose strokes in the final stretch, and be placed third or fourth in the first nine to allow a warm-up period before attempting the accurate shots par 3s should demand."

(Continued on Page 14)

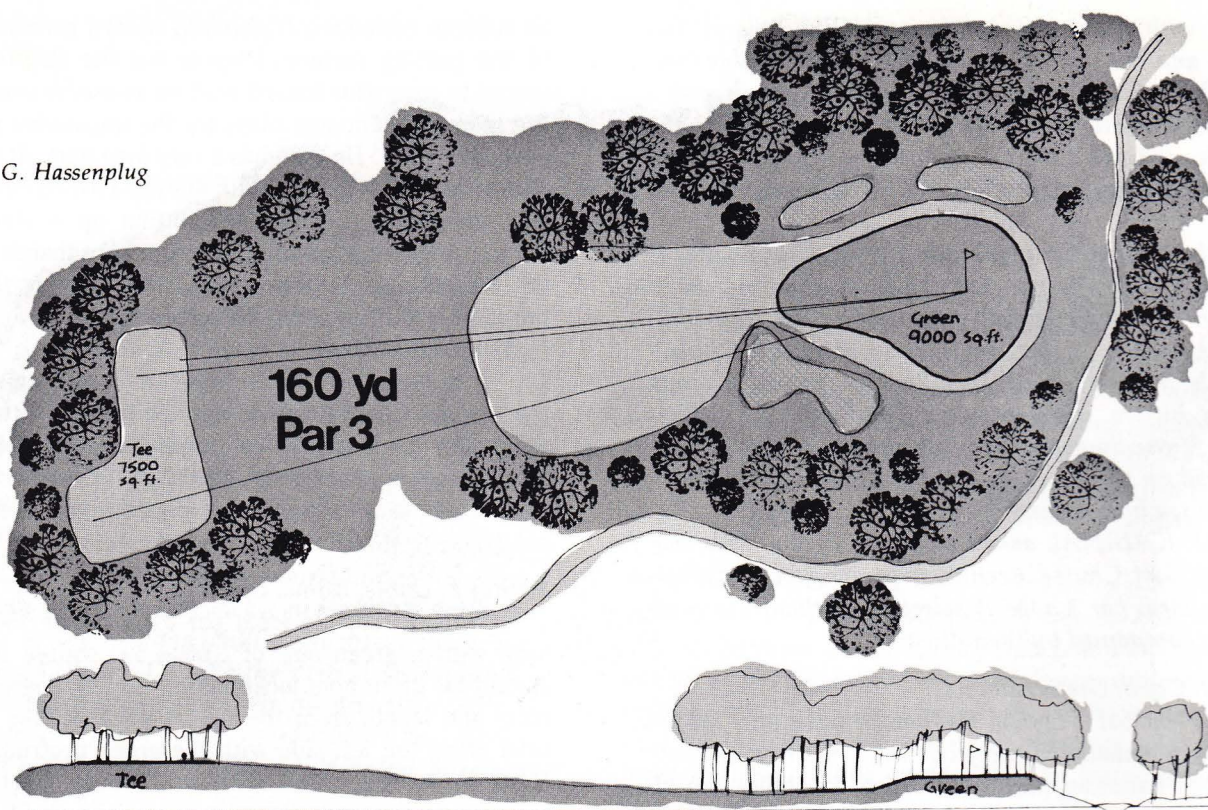


George W. Cobb



Arthur L. Davis

X. G. Hassenplug



(Continued from Page 13)

David Gill, St. Charles, Ill.

"In discussing the design of the ideal par 3 golf hole, it is important to consider where the hole falls on the land and in the round. Each par 3 must conform to its respective place in the golf course. The hole must serve one specific purpose, which will be unique in each situation where a short hole occurs.

"The par 3 18th hole at my club, the St. Charles Country Club, is what I consider one of the finest par 3 holes in the world (see illustration). It has a definite function on this particular golf course. It is terribly difficult to make a good par 3 finishing hole, but this one has all the necessities.

"The most important thing is *it treats all golfers alike*, whether the golfer is strong, accurate and plays scratch golf, or is a 22-handicapper maybe 75 years old and only capable of effectively hitting the ball 160 yards.

"The hole requires 97 percent carry over water and the distances can range from 160 yards down to about 125 yards. Depending on the time of year and the wind, it can be a 3-iron to a pitching wedge for a scratch golfer and a 3-wood to a 7-iron for a 22-handicapper.

"The hole requires any shot to be almost 100 percent accurate to be assured of a par. The green is quite long and narrow, with water on the right as well as in front. Bunkers protect both sides and the rear of the green. Any putt over five feet is difficult to make.

"A one-shot hole must fulfill a purpose in a round of golf, be a fair test for all handicap players and fit the topography, character and climate of the location. The 18th at

St. Charles meets these criteria and can be considered my ideal par 3 hole."

X.G. Hassenplug, Pittsburgh, Pa.

"The ideal par 3 hole might be 160 yards, with a putting surface of 8,000-10,000 square feet. The green should be contoured to permit many hole locations. A large tee area would permit the turf to recover from heavy iron play and also present the opportunity to move tee markers from day to day, thus changing the hole. The location of one-shot holes in an 18-hole layout is most important. A change of pace for the golfer makes the round more pleasant. Par 3 holes can cause a traffic problem, contributing to slow play. I don't like par 3s used as starting or finishing holes."

Arthur Hills, Toledo, Ohio

"The ideal par 3 should be separated from surrounding holes by natural features. The ideal par 3 ought to be medium in length (150-180 yards). The hole is ideally viewed from slightly above the green elevation so that the hole locations and hazards can be clearly seen. Water in the form of a pond or stream is often an element. The green should have distinct hole location areas (from easy to difficult)."

Gerald H. Matthews, Laingsburg, Mich.

"Since the par 3 is a one-shot hole, its sequence in an 18-hole round should be staggered to break up the monotony of too many relatively long successive par 4s and par 5s. Ideally, I like to see par 3s immediately before or after a par 5 for the stark contrast and/or the relief in distance.

"In length there should be a mixture ranging from 140 yards to about 210 yards, with one of the shorter range and one of the longer range in each nine holes. Par 3s long-

er range in each nine holes. Par 3s longer than 200 yards tend to be very difficult for the average golfer, from the standpoint of both distance and accuracy.

"Because of their one-shot possibility, par 3s can take advantage of extreme terrain features not suited to other golf holes. The ideal par 3 should include all of the elements available to a golf course architect: topography, trees, water, sand and wind.

"Therefore, my ideal par 3 (see illustration) would play from an elevated tee (30-60 feet above the green), over a body of water along the right side and carrying out in front of the green to the left of the centerline of the fairway. The back tee would be all water carry, the middle tee approximately half that, and the front, or ladies tee would be on the left side with virtually no water carry. It should play about 160 yards from the middle tee, 180 yards from the championship tee and 140 yards from the front tee. The entire fairway and rear of the green should be narrow and tree-lined with a spectacular backdrop of mountains or water beyond. The green should be elevated two to four feet above adjacent areas, about 6,000 square feet of undulating putting surface. One bunker would be placed behind the green, a large one on the right front corner and a small one on the left front. This leaves the left side of the green fairly open, while hole locations on the right side require an accurate shot over water and sand, with sand also in play for shots that are too long.

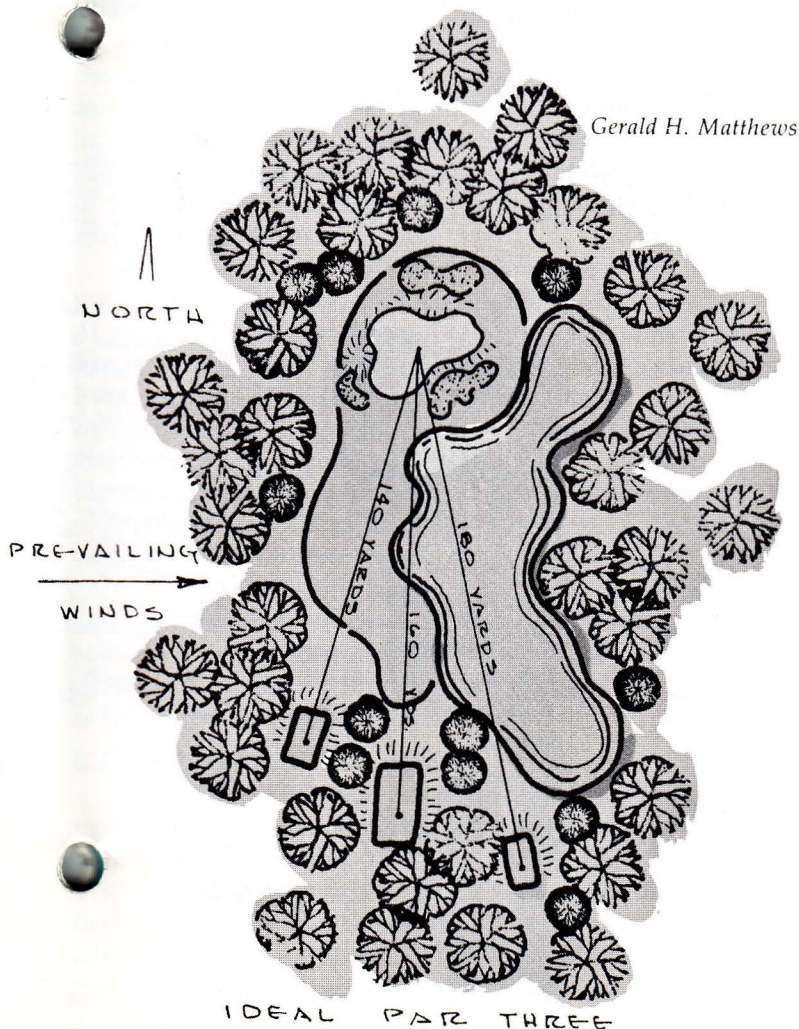
"This hole should occur on the second nine of an 18-hole course, preferably hole No. 15, 16 or 17, and should be one of the more spectacular holes on the course. The golfer should finish his round with this hole fresh in his memory."

William Howard Neff, Salt Lake City, Utah

"In general my ideal par 3 is one that provides multiple tees for use under varied conditions. From day to day the hole can change completely because of a slight change in angle of approach, and change in length or a change of wind direction. If the hole has multiple tees, then because of the distance and angle of approach variations, fair or diabolical teeing spots can be chosen to meet the good or bad weather conditions forecast for the coming day. A tough par 3 hole without built-in flexibility (multiple tees) can at times be impossible to play.

"I prefer the hole to be slightly downhill or such that the green is completely visible from each tee, with the green slightly elevated, contoured in a general wave-like fashion and 6,500-7,000 square feet in area. All hazards should be visible from the tee. One of the two wide points of the green should be closer to the tee than the other. The hole should play from 140-190 yards. If one par 3's y-axis orientation (see illustration) requires a draw shot to reach its most difficult corner, then one of the other par 3s should

(Continued on Page 17)

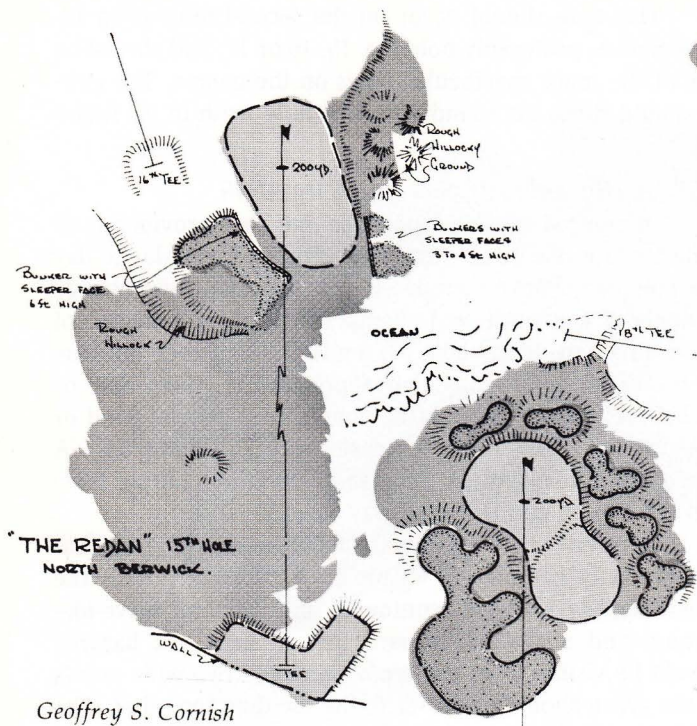


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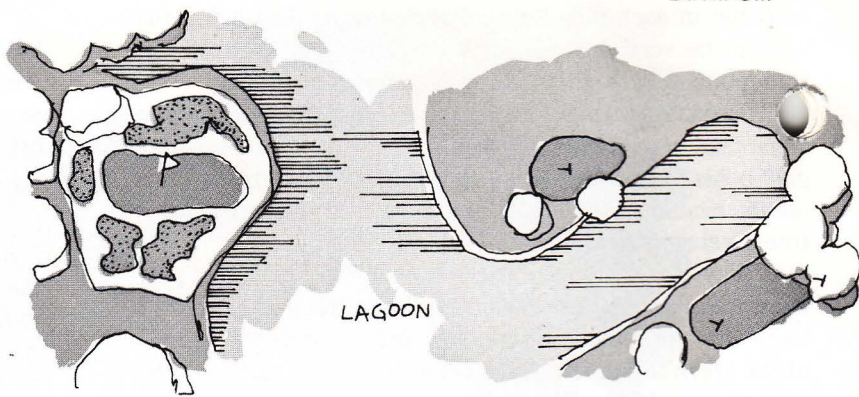
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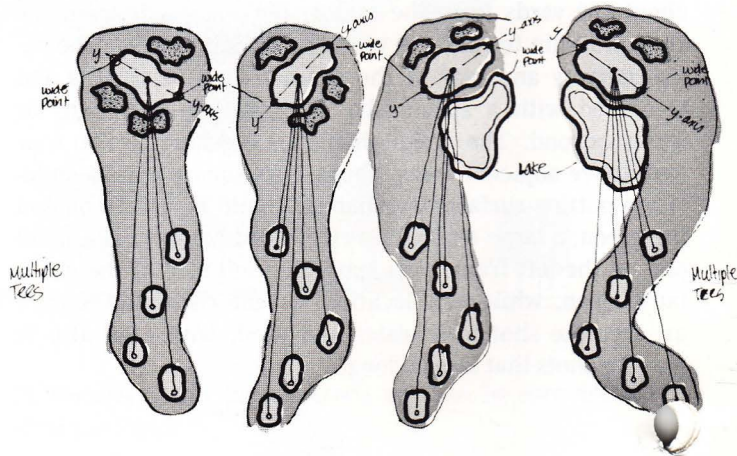
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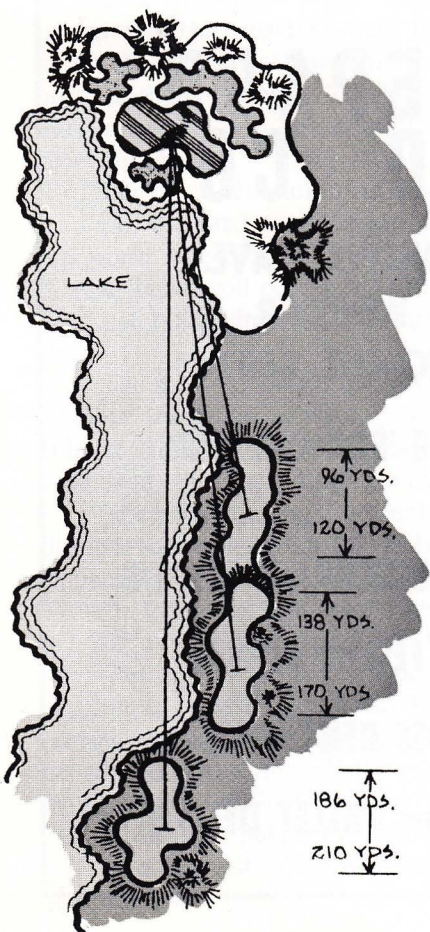


HOLE No. 17
PEBBLE BEACH

This is very diagrammatic but will get the idea across.

Mounding used to create a background for the green and bunkers, also to tie the shapes into the existing terrain.

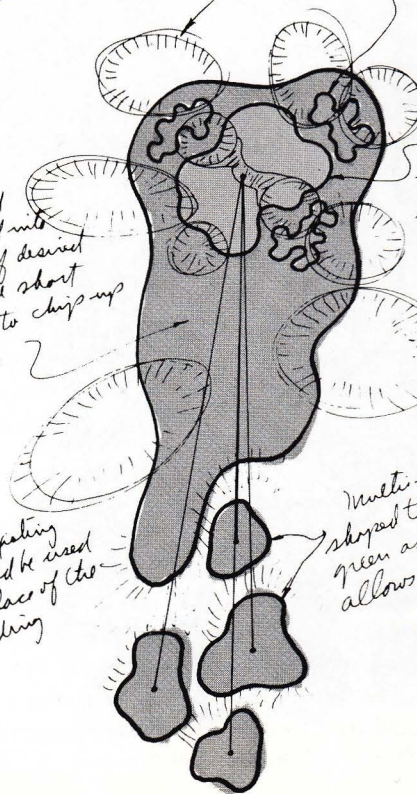
Moderately tightly bunkered, so to direct the shot and others to assist the golfer, as required.



Edwin B. Seay

the foreground can be developed into a forced carry if desired or else give the short hitter a chance to chip up and one-putt.

Where possible, existing trees or terrain would be used along with or in place of the bunkers and mounding shown.



Basically a "T" shaped green affording a tough pin position on the right for tournament play and the majority of the green surface for everyday use. Entire surface should be visible with contour that ties into the existing topography. (Multi-level if it fits the situation)

Multi-level and naturally shaped trees, elevated above the green as existing terrain allows

RMG

Robert Muir Graves

(Continued from Page 15)

require a fade shot to its most difficult area. If one par 3 is uphill, another should be downhill, and so on . . . I like the use of water for a semi-frontal hazard because of its beauty and reflective nature, and of course the punitive factor. While I think a safe route should always be open to a player at the expense of a stroke, I can see no reason to deprive the ladies of the thrill and challenge of negotiating a hazard.

"I think par 3s, tough as they are, should be significantly placed in the finishing holes of both nines."

Roger B. Packard, LaGrange, Ill.

"The ideal par 3, as with the par 4s and par 5s, should be a hole of strategic design that will provide for a greater or lesser degree of accuracy depending upon the location of the tee markers and the hole. This type of design allows for the variation required by the golf course superintendent or the golf committee in charge of setting up the course for any given round to balance out not only the par 3 holes but also the entire course to the desired degree of difficulty of play for that particular day.

"If it is a valid approach to design the par 3s with a range in distance from 135 yards to 190 yards from the middle tees and with tees long enough to lengthen or shorten each hole by 20 yards, the ideal par 3 length would be in the mid-range length of 160 yards.

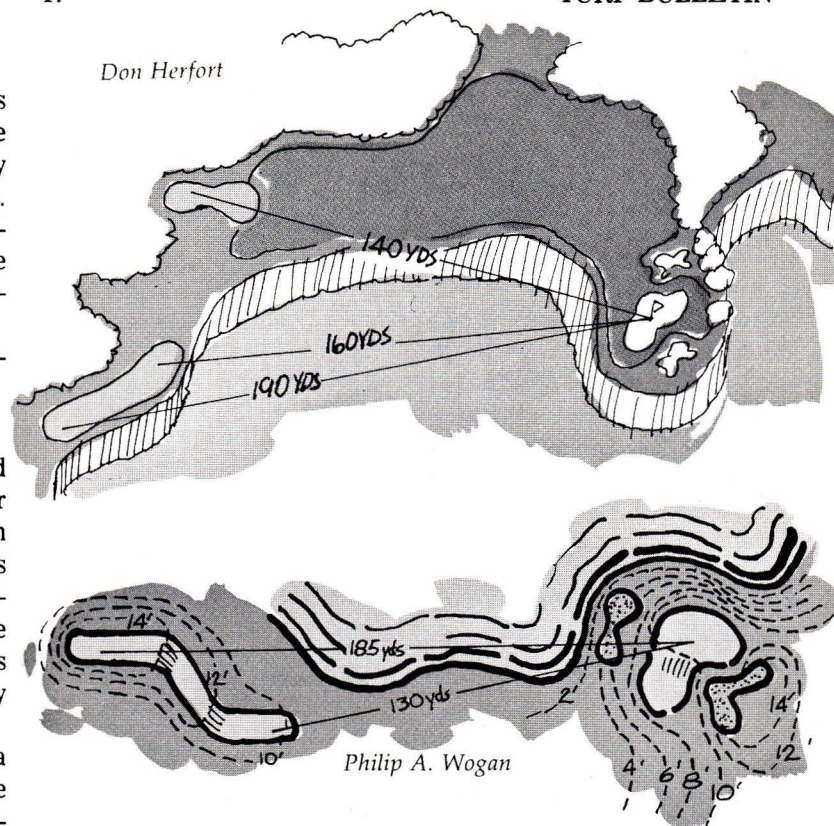
"The hole would then be designed with either bunker or water lying diagonally across about two-thirds to three-fourths of the front of the green and with mounds and trees around the back. There would be sufficient area to one side and in front of the green for very high handicap players to aim toward the 'safe' side of the green, but of course such a shot, if played too short, would result in reaching the green in two.

"A most important aspect of the design of the ideal par 3 relates to the size, pitch and undulation of the green. At a distance of 160 yards, the green should be of medium size only, and should carry a medium pitch from back to front, and should only be moderately undulating. This design will present a target beautifully visible from the tee, and there will be a medium requirement for backspin on the ball. Once on the green, there will also be a moderate requirement for reading the break of the green in order to obtain par with the normal two putts.

"Finally, if it is possible to arrange the tee so that it has some considerable elevation above the green, such a hole will provide added zest and excitement because of the ability to view and admire all the elements of the danger as well as the beauty of the hole."

C.E. Robinson, Toronto, Canada

"It is my opinion that par 3 holes are potentially the most spectacular and inspiring holes of any layout. The ideal length ranges from 170-190 yards and if possible, the hole should include a water hazard. Such a hole should be flexible enough through tee arrangement and hole locations to test the scratch golfer to the utmost, and as well provide alternate carries for the average or bogey golfer."



Edwin B. Seay, Ponte Verda Beach, Fla.

"I have indicated water in my ideal par 3 (see illustration) as I feel it offers the ultimate in challenge and beauty. Scenic beauty and challenge can also be achieved by incorporating the natural terrain features or by creating dramatic features in construction (bunkers, mounds, undulating greens, etc.)."

Philip A. Wogan, Beverly, Mass.

"I prefer a par 3 which would be in the 185-yard range, and would require a range of clubs from a 4-wood to a 5-iron, depending on weather conditions and the skill of the golfer. A par 3 should place a premium on accuracy, both as to distance and direction. From the back tee, this hole (see illustration) plays from a slightly elevated tee to an average-size green, about 6,000 square feet; an uncontrolled hook is severely punished by catching the left banking, hence the water. The bunker in front of the green is some six feet below the upper level of the terraced green, and requires a well-executed explosion shot of some height. The bunker to the rear is above the green surface and should be deep enough to require a finesse wedge to the hole. A hole location on the right and lower terrace provides for a somewhat easier golf shot. The length of the tee allows for an adequate challenge for both men and women. Since it is my opinion that the middle and short irons make up the essence of the game and provide the most fun for the majority of golfers, I believe provisions should be made to allow the use of these clubs to as great a degree as possible. In a nutshell, the suggested par 3 provides for variety, accuracy and finesse."

(Continued on Page 18)

AMERICA'S BEST PAR 3s

Not every golf course architect sees his plan for an ideal par 3 turned into an actual golf hole. Therefore, GOLF JOURNAL asked the members of the American Society of Golf Course Architects not only to describe and illustrate their ideal par 3, but also to choose the best existing par 3 holes in the United States and explain their selections.

According to the architects, the five best par 3s are:

1. 16th, Cypress Point, 233 yards.
2. 7th, Pebble Beach, 120 yards.
- T3. 12th, Augusta National, 155 yards.
- T3. 16th, Augusta National, 190 yards.
5. 15th, Cypress Point, 139 yards.

Four of the five holes on this list were originally designed by Dr. Alister MacKenzie, the Scottish physician-turned-golf-course-architect whose life and work were featured in the April issue of GOLF JOURNAL. Jack Neville designed Pebble Beach, and Robert Trent Jones completely redesigned MacKenzie's 16th at Augusta National in 1947.

Here are some of the architects' comments about the top five.

16th, Cypress Point

"Surely this is the most dramatic and memorable hole in America."

—Geoffrey S. Cornish

"It incorporates drama, scenic beauty and skill and will probably never be equalled. Nothing more need be said."

—Arthur L. Davis

"While longer than the average golfers can enjoy, its sheer beauty and awesome potential for trouble put it in a class of its own. Playing this hole into the wind and salt spray and hearing the surf pounding on the rocks is an experience one does not soon forget. Where else can one find a par 3 where the 'safe' alternative is to the fairway, not the green!"

—Gerald H. Matthews

"It is beautiful, it is fun, and it invites a challenge. The player has a choice of attack, and the playing conditions are always changing. A superb golf hole."

—Edwin B. Seay

"It is not a difficult hole on most days because the green is wide open; however, the awesome chasm of water and rock make this one of the most spectacular and dramatic golf holes."

—Philip A. Wogan

7th, Pebble Beach

"This short one-shotter calls for a short iron today and a long one tomorrow. It is probably the most photographed par 3 in America because of its surroundings and because the designer, Jack Neville, observed the principles of art in planning and executing it."

—Geoffrey S. Cornish

"A tiny narrow green on a very short hole. The hole intrigues me because it requires such accuracy."

—Arthur Hills

"A favorite as it shows what can be done on a very little but spectacular, piece of real estate. It is very well bunkered, looks easier than it is, and as the wind picks up, scores go up."

—Gerald H. Matthews

"It has to be one of the better par 3s in the country. With the small green, the very deep bunkering, the steep edges on the green side, and the wind factor, this tiny par 3 can play from a 3-iron to a wedge. This hole puts a premium on accuracy and on nerve."

—Philip A. Wogan

12, Augusta National

"One of the truly great par 3 holes. A very challenging hole. I have seen many architects try to copy this hole many times. Rae's Creek in front and the bunkers in back of the green require a well-planned tee shot."

—S. G. Hassenplug

"Demands a precise shot to a shallow green. The setting is beautiful with huge trees and broadleaf evergreens in the background. Water comes into play across the front of the green."

—Arthur Hills

16th, Augusta National

"Although the area from tee to green is water, there is fairway provided to the right. This hole is dramatic and testing. In a sense it is a slight modification of the Red

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On the other hand it is a distinctive golf hole which has itself been widely imitated."

—Geoffrey S. Cornish

"The tee shot out of the pines, with nearly a total carry over water, makes it necessary to use exactly the right club, yet it is short enough so most can reach the green."

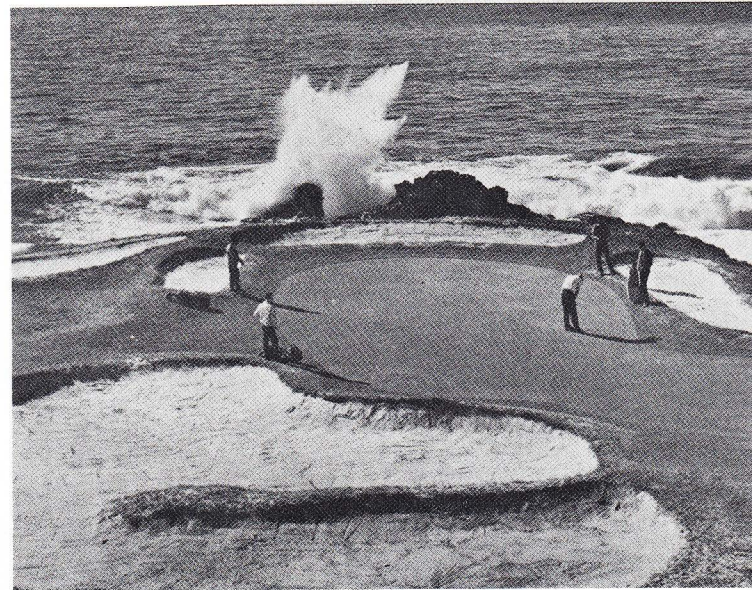
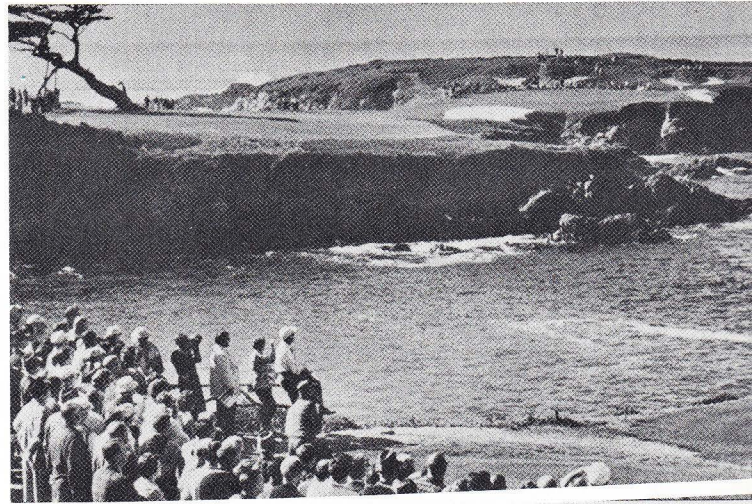
—Gerald H. Matthews

15th, Cypress Point

"This golf hole incorporates all of the characteristics that I look for and design for. It's a challenge to hit a rather small green tightly guarded by bunkers and requiring a forced carry across an inlet of the Pacific Ocean. It is fair in that it is a makeable distance for nearly any caliber of golfer, and you can favor the left side, which is a little bit safer. It is a natural appearing and very beautiful golf hole with a background of cypress trees and an attractive combination of rolling turf and sand dunes.

"It is a shame that this hole has been virtually ignored by the golf industry due to its next door neighbor, the 16th. Although the 16th is a spectacular hole and one of my favorites, it does not have the natural beauty of the 15th."

—Robert Muir Graves



Top: The 16th, Cypress Point. Bottom: The 7th, Pebble Beach

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Last August Dr. Robert N. Carrow left the University of Massachusetts to assume a position at Kansas State University. All were quite sorry to lose Bob as he instituted a number of fine research projects and was a very valuable asset to our program. Since his departure search committees were involved in locating a replacement and we are quite happy to report that Dr. Kurt Hurto from Illinois will be joining us in January to assist in our program.



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