1. Soil types and climatic conditions.
2. Topography.
3. Natural and artificial features, such as timber, rock, buildings, roads, etc.
4. Available water supply.

These mechanical component parts directly govern local type of architecture. Seaside courses should be at seaside; prairie courses, prairie; mountain, desert and island courses should fit their environments.

Too often, in our feeble attempts to improve on nature, we try to place one of these component parts in a setting that does not fit the locality, making for tough maintenance, unnatural settings and near disastrous results.

Some of the important principles of architecture are the size, shape and contour of the green, and this includes, as stated before, the approach, collar and apron. These are governed by the nature of strokes played onto them and the wear and tear they will undergo. There are few things more irritating to a player than to play the approach well and have the ball leave the green.

Dave Gill has pointed out that Golfdom misinterpreted his GCSA convention remarks (Feb., p. 66). It read: "He questioned whether an architect, unfamiliar with a particular region, can come in and do better than an average job of layout because of soil and climatic factors with which he is not familiar." This should have been added: ". . . if he is not willing to follow the dictates of nature."

It was not Dave's intention to infer, in any way, that an architect can only work in his back yard. A capable one can work anywhere.

Entrance to Green

The entrance to the green, whether large or small, rolling or flat, should be constructed so a player can accurately judge behavior of the ball after it lands. This is not the putting surface itself — this is the area in front of the green. Quite often it is a forgotten place.

In connection with the tees, there have been many odd-ball designs and shapes given them. This may be forgiven, however, providing the tee is of sufficient size, is smooth, blends into the landscape and is properly oriented to fairway or green and wind and the sun.

The fairway is architecturally the most difficult to design. Thus, it usually receives the least thought. Too much consideration is given to the whole length and rotation.

Put Nature to Work

The important thing to do is to turn the job over to Mother Nature. She can, in most cases, handle the fairways. Make minor adjustments in her topography and give her a little more nutrition and moisture than she usually provides. That is the way in which you can help her.

In connection with the rough and nature of the hazards, the characteristic requirements of a hazard are:

1. It should be difficult but not impossible to play out of.
2. It should not be a cause of lost balls.
3. Strokes played out should be calculable as regards to strength and direction.
4. The strokes should depend, for their success, on skill and not brute force.

Element of Risk

The object of traps, actually, is to introduce an element of risk and to tempt the player to either play through or skirt them. The penalties and playing should be in direct proportion to one another. The penalty should not serve essentially as something to scare the golfer away.

Now then, a word about landscape. The appreciation of pleasant surroundings is often subconscious. Many golfers are no doubt under the impression that while they are playing, they are entirely engrossed in the game. They do enjoy, however, having something to look at.

A golf course should be regarded not merely as an area for a contest but a property which should be improved in every way. But economy shouldn't be forgotten.

Microorganisms and Nitrogen Release

By WILLIAM MARTIN
University of Minnesota

Microorganisms work over nitrogen and effect various changes. Eventually soil microorganisms make nitrogen available to plants.

We have many general purpose soil microorganisms which release nitrogen in ammonia form. This will occur whether soils are good or poor. There are, however, a very few specialized bacteria which release or transform ammonia into nitrate nitrogen. The pH values have to be near neutral and slightly acid. In the soil root

we have clay particles with ammonia nitrogen attached very closely to the particles. By exchange, this may then be released and taken up by the plant.

Ammonia iron in high concentration can be toxic to plants. Nitrate nitrogen, on the other hand, is not attached to soil particles. It can also be taken up by the plants. The point is that the form of nitrogen is extremely significant in any nitrogen laws.

We are concerned with the organic nitrogen compounds, such as might be represented by a crop residue. These are decomposed in the soil by microorganisms.

The nitrogen with which we are concerned may be released, may be taken up directly by the plant or may go into a humus coating. This will be organic to the nitrogen supply in the soil.

Competition Occurs

In the case of low nitrogen residue, competition occurs. Nitrogen must be used by microorganisms. Taken away from the plant, the microorganisms feed at the first table. We can define this need in terms of a so-called nitrogen factor. This factor is the amount of nitrogen which is immobilized by the microorganisms, in effect, in decomposition of organic materials. We can give this in terms of a ratio of carbon to nitrogen of 20 to 1.

Another form of loss that sometimes occurs under good conditions of variation, but is particularly poor where nitrogen is added or compaction exists, is by what we call denitrification. Microorganisms under restricted drainage will actually reduce nitrate nitrogen to gaseous forms of nitrogen. This may occur in the cell, in the manure pile or in the soil. This is a form of loss that is very critical.

According to our findings nitrogen content of most soils decreases regardless of how much is added. This is mentioned because it was thought that one could add nitrogen to a low nitrogen residue and actually build up the organic matters in content. However, what happens in this connection is that the net result is general loss of organic matter.

A large proportion of the nitrogen, not recovered in crops, is found in the leachate. Substantial and unaccounted for losses occur in most experiments.

There has been quite a bit of discussion about the use of organics. Some very interesting work has been done in the South under conditions of high moisture — warm soil conditions — on the rate at which nitrogen may be realized from a group of organic materials from high to low grade

(*Continued on page* 92)

Bacteria and Nitrogen

(*Continued from page* 60)

nitrogen as compared with ammonium sulfate.

For all practical purposes the nitrogen is transformed to the readily leachable nitrate form very quickly. However, the same thing occurs so far as readily available nitrogen is concerned from the organic nitrogen samples.

Subsequent release is very slow but the thing that is significant with all of these tests is the total amount of nitrogen that is released. Of course, part of this is tied up in the organic reserve.

With urea forms it is possible, by varying the ratio of urea to formaldehyde, to come up with a material which does provide for a nitrification curve much better than anything else. The work carried on has shown that the qualities of these materials can be equivalent to what one would obtain from the better organics and also from repeated applications of the solubles. But the tests are expensive and the fact remains that the nitrification pattern still reestablishes nitrogen in nitrate form which is subject to loss.

I suspect that you would find a loss of nitrogen that doesn't get into the crop a rather substantial and significant one.

One other thing that I must say here is that the use of organics has value other than as a source of nitrogen. Thus, I am not minimizing the value of any organic materials.

Weak on Women's Displays

"Professionals who think they are good businessmen would be surprised if they realized their women members don't know how eager pros are to sell women's clubs." This observation was made by a Pacific Coast pro line salesman.

The situation isn't restricted to the Pacifc Coast, according to reports Golfdom has received from salesmen who sell to pros in other districts.

Says a salesman who calls on pros in the New York metropolitan district: "Very seldom does a pro shop display emphasize that certain clubs are made especially for women. The pro thinks that the box containing clubs with a women's brand name will do all the advertising necessary. The job needs a lot more pushing than this. The pro should have some attractive sign calling attention to his special department of women's clubs.
