<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8" />

<meta name="viewport" content="width=device-width, initial-scale=1.0" />

<title>MutAnnotator</title>

<style>

body { font-family: Arial, sans-serif; padding: 20px; max-width: 800px; margin: auto; }

textarea { width: 100%; height: 120px; margin-bottom: 10px; }

button { padding: 10px 20px; font-size: 16px; }

table, th, td { border: 1px solid black; border-collapse: collapse; padding: 6px; }

table { margin-top: 20px; width: 100%; }

</style>

</head>

<body>

<h1>🧬 MutAnnotator</h1>

<p>Paste your Reference and Mutated DNA sequences (plain or FASTA format).</p>

<label>Reference Sequence:</label>

<textarea id="refSeq"></textarea>

<label>Mutated Sequence:</label>

<textarea id="mutSeq"></textarea>

<button onclick="annotate()">Annotate Mutations</button>

<div id="results"></div>

<script>

const codonTable = {

'ATA':'I','ATC':'I','ATT':'I','ATG':'M',

'ACA':'T','ACC':'T','ACG':'T','ACT':'T',

'AAC':'N','AAT':'N','AAA':'K','AAG':'K',

'AGC':'S','AGT':'S','AGA':'R','AGG':'R',

'CTA':'L','CTC':'L','CTG':'L','CTT':'L',

'CCA':'P','CCC':'P','CCG':'P','CCT':'P',

'CAC':'H','CAT':'H','CAA':'Q','CAG':'Q',

'CGA':'R','CGC':'R','CGG':'R','CGT':'R',

'GTA':'V','GTC':'V','GTG':'V','GTT':'V',

'GCA':'A','GCC':'A','GCG':'A','GCT':'A',

'GAC':'D','GAT':'D','GAA':'E','GAG':'E',

'GGA':'G','GGC':'G','GGG':'G','GGT':'G',

'TCA':'S','TCC':'S','TCG':'S','TCT':'S',

'TTC':'F','TTT':'F','TTA':'L','TTG':'L',

'TAC':'Y','TAT':'Y','TAA':'\*','TAG':'\*','TGC':'C','TGT':'C','TGA':'\*','TGG':'W'

};

function parseSequence(seq) {

return seq.replace(/^>.\*\n?/gm, '').replace(/\s+/g, '').toUpperCase();

}

function translateDNA(dna) {

let protein = [];

for (let i = 0; i < dna.length - 2; i += 3) {

let codon = dna.slice(i, i + 3);

protein.push(codonTable[codon] || '?');

}

return protein;

}

function annotate() {

const ref = parseSequence(document.getElementById('refSeq').value);

const mut = parseSequence(document.getElementById('mutSeq').value);

const refAA = translateDNA(ref);

const mutAA = translateDNA(mut);

let html = '<table><tr><th>Position</th><th>Ref Codon</th><th>Ref AA</th><th>Mut Codon</th><th>Mut AA</th><th>Type</th></tr>';

const len = Math.min(ref.length, mut.length);

for (let i = 0; i < len - 2; i += 3) {

const codonRef = ref.slice(i, i+3);

const codonMut = mut.slice(i, i+3);

const aaRef = codonTable[codonRef] || '?';

const aaMut = codonTable[codonMut] || '?';

let type = 'Silent';

if (aaRef !== aaMut) type = aaMut === '\*' ? 'Nonsense' : 'Missense';

html += `<tr><td>${(i/3)+1}</td><td>${codonRef}</td><td>${aaRef}</td><td>${codonMut}</td><td>${aaMut}</td><td>${type}</td></tr>`;

}

html += '</table>';

document.getElementById('results').innerHTML = html;

}

</script>

</body>

</html>