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<150> US 63/120,362

<151> 2020-12-02

<160> 62

<170> PatentIn version 3.5

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<213> Artificial Sequence

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<223> Nucleotide sequence of alphavirus native subgenomic promoter

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<223> Nucleotide sequence of extended subgenomic promoter (v2)

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<223> Nucleotide sequence of extended subgenomic promoter (v3)

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<223> Nucleotide sequence of wild-type EMCV IRES

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<220>
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<220>
 <223> Nucleotide sequence of influenza A virus N1 neuraminidase subtype

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 <212> DNA
 <213> Artificial Sequence

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 <223> Nucleotide sequence of SARS-CoV-2 nucleocapsid (N) protein

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<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence of SARS-CoV-2 spike (S) protein

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 <223> Nucleotide sequence of SARS-CoV-2 modified spike (S) protein

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<220>
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(A/California/09)

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<220>

<223> Nucleotide sequence of influenza A virus M1 matrix protein
(A/California/09)

<400> 29

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<211> 15335

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of construct Co18

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<210> 32

<211> 3822

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of SARS-CoV-2 spike (S) protein uncleavable
(S1/S2 RRAR to QQAA mutation and 986P/987P mutation)

<400> 32

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<210> 33

<211> 3822

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of SARS-CoV-2 modified spike (S) protein
uncleavable (S1/S2 RRAR to QQAA mutation and D614G mutation)

<400> 33

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aaggctttta gatcctccgt cctgcattct acgcaggatc tcttcttgcc attcttcagc	180
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<210> 34

<211> 3822

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of SARS-CoV-2 modified spike (S) protein
uncleavable (S1/S2 RRAR to QQAA mutation and S2' mutation)

<400> 34

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<223> Nucleotide sequence of SARS-CoV-2 modified spike (S) protein
uncleavable (S1/S2 RRAR to QQAA mutation and D614G mutation and
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 cleavable (D614G mutation)

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Thr Arg Gly Val Tyr Tyr Pro Asp Lys Val Phe Arg Ser Ser Val Leu
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His Ser Thr Gln Asp Leu Phe Leu Pro Phe Phe Ser Asn Val Thr Trp
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Phe His Ala Ile His Val Ser Gly Thr Asn Gly Thr Lys Arg Phe Asp
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Lys Thr Gln Ser Leu Leu Ile Val Asn Asn Ala Thr Asn Val Val Ile
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Tyr His Lys Asn Asn Lys Ser Trp Met Glu Ser Glu Phe Arg Val Tyr
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210 215 220

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225 230 235 240

Leu Leu Ala Leu His Arg Ser Tyr Leu Thr Pro Gly Asp Ser Ser Ser
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405

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415

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gcgctcccat tcgccattca	ggctgcgcaa ctgttgggaa	gggcgtttcg gtgcgggcct		13260
cttcgctatt acgccagctg	gcgaaagggg gatgtgctgc	aaggcgatta agttgggtaa		13320
cgccagggtt ttcccagtca	cacgcgtaat acgactcact	atag		13364

<210> 54

<211> 1701

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of influenza A virus H3 protein
(A/Delaware/39/2019)

<400> 54

atgaagacta tcattgcttt	gagctacatt ctatgtctgg	ttttcactca aaaaattcct	60
ggaaatgaca atagcacggc	aacgctgtgc cttgggcacc	atgcagtacc aaacggaacg	120
atagtgaaaa caatcacaaa	tgaccgaatt gaagttacta	atgctactga gttggttcag	180
aattcctcaa taggtaaaat	atgcgacagt cctcatcaga	tccttgatgg agggaaactgc	240
acactaatag atgctctatt	gggggaccct cagtgtgacg	gctttcaaaa taagaaatgg	300
gacctttttg ttgaacgaag	cagagcctac agcaactgtt	acccttatga tgtgccggat	360

tatgcctccc ttaggtcact agttgcctca tccggcacac tggagtttaa aaatgaaagc	420
ttcaattggg ctggagtcac tcaaacgga aaaagttttt cttgcataag gggatctagt	480
agtagtttct ttagtagatt aaattggttg acccatttaa actacacata tccagcactg	540
aacgtgacta tgccaaacaa ggaacaattt gacaaattgt acatttgggg ggttcaccac	600
ccgggtacgg acaaggacca aatctccctg tatgctcaat catcaggaag aatcacagta	660
tctacaaaaa gaagccaaca agctgtaatc ccaaatatcg gatctagacc cagaataagg	720
gatatcccta gcagaataag catctattgg acaatagtaa aaccgggaga catacttttg	780
attaacagca cagggaatct aattgctcct aggggttact tcaaaatacg aagtgggaaa	840
agctcaataa tgagatcaga tgcaccatt ggcaaatacg agtctgaatg catcactcca	900
aatggaagca ttcccaatga caaaccattc caaaatgtga acaggatcac atacggggcc	960
tgtcccagat atgttaagca aagcactctg aaattggcaa caggaatgcg aaatgtacca	1020
gagaaacaaa ctagaggcat atttggtgca atagcgggtt tcatagaaaa tggttgggag	1080
ggaatggtgg atggttggtg cggtttcaga catcaaaatt ctgagggaag aggacaagca	1140
gcagatctca aaagcactca agcagcaatc gatcaaatca atgggaagct gaatcgattg	1200
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agagttcaag accttgagaa atatgttgag gacactaaaa tagatctctg gtcatacaac	1320
gcggagcttc ttgttgccct ggagaaccaa catacaattg atctaactga ctcagaaatg	1380
aacaaactgt ttgaaaaaac aaagaagcaa ctgagggaaa atgctgagga tatgggaaat	1440
ggttgtttca aaatatacca caaatgtgac aatgcctgca taggatcaat aagaaacgaa	1500
acttatgacc acaatgtgta cagggatgaa gcattaaaca accggttcca gatcaaggga	1560
gttgagctga agtcagggta caaagattgg atcctatgga tttcctttgc catatcatgt	1620
tttttgcttt gtgttgcttt gttggggttc atcatgtggg cctgccaaaa gggcaacatt	1680
agatgcaaca tctgcatttg a	1701

<210> 55

<211> 1410

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of influenza A virus N2 protein
(A/Delaware/39/2019)

<400> 55

atgaatccaa atcaaaagat aataacgatt ggctctgttt ctctcacaat ttccacaata	60
tgcttcttca tgcaaattgc catcctgata actactgtaa cattgcattt caagcaatat	120
gaattcaact ccccccgaa taaccaagtg atgctgtgtg aaccaacaat aatagaaaga	180
aacataacag agatagtgtg ttgaccaac accaccatag agaaggaaat atgccccaaa	240

ccagcagaat acagaaattg gtcaaaaccg caatgtgaca ttacaggatt tgcacctttc	300
tctaaggaca attcgattag gctttccgct ggtggggaca tctgggtgac aagagaacct	360
tatgtgtcat gcgaccttga caagtgttat caatttgac ttggacaggg aacaacacta	420
aacaacgtgc attcaaataa cacagtacgt gataggaccc cttatcggac tctattgatg	480
aatgagttgg gtgttccttt ccatctgggg accaagcaag tgtgcatagc atggtccagc	540
tcaagttgtc acgatggaaa agcatggctg catgtttgta taacggggga tgataaaaat	600
gcaactgcta gcttcattta caatgggagg cttgtagata gtgttgtttc atggtccaac	660
gatatttcta ggaccaggga gtcagaatgc gtttgatca atggaacttg tacagtagta	720
atgactgatg gaaatgccac aggaaaagct gatactaaaa tactattcat tgaggagggg	780
aaaatcgttc atactagcaa attgtcagga agtgctcagc atgtcgaaga gtgctcttgc	840
tatcctcgat atcctggtgt cagatgtgtc tgcagagaca actggaaagg atccaaccgg	900
cccatcatag atataaacat aaaggatcat agcattgttt ccagttatgt gtgttcaggg	960
cttgttgag acacaccag aaaaagcgac agctccagca gtagccattg tttgaatcct	1020
aacaatgaaa aagggtgtca tggagtgaag ggctgggcct ttgatgatgg aaatgacgtg	1080
tggatgggga gaacaatcaa cgagacgtca cgcttagggg atgaaacctt caaagtcgtt	1140
gaaggctggt ccaaccctaa gtccaaattg cagataaata ggcaagtcac agtggataga	1200
ggtgataggt ccggatacag cggtatcttc tctgttgaag gcaaaagctg catcaatcgg	1260
tgcttctatg tggagttagt taggggaaga aaagaggaaa ctgaagtctt gtggacctca	1320
aacagtattg ttgtgttttg tggcacctca ggtacatatg gaacaggctc atggcctgat	1380
ggggcggacc tcaatctcat gcatacataa	1410

<210> 56

<211> 1755

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of influenza B virus Hyam (B/Singapore/INFTT
16 0610/16 (By))

<400> 56

atgaaggcaa taattgtact actcatggta gtaacatcca atgcagatcg aatctgcact	60
gggataacat cttcaaacct acctcatgtg gtcaaaacag ctactcaagg ggaggtcaat	120
gtgactggcg tgataccact gacaacaaca ccaacaaaat cttattttgc aaatctcaaa	180
ggaacaagga ccagaggga actatgcccg gactgtctca actgtacaga tctggatgtg	240
gccttgggca ggccaatgtg tgtggggacc acaccttctg ctaaagcttc aatactccat	300
gaggtcagac ctgttacatc cgggtgcttt cctataatgc acgacagaac aaaaatcaga	360
caactacca atcttctcag aggatatgaa aagatcaggt tatcaacca aaacgttatc	420

gatgcagaaa aagcaccagg aggaccctac agacttggaa cctcaggatc ttgccctaac	480
gctaccagta aaattggatt tttttcaaca atggcttggg ctgttccaaa ggacaactac	540
aaaaatgcaa cgaaccacaca aacagtggaa gtaccatata tttgtacaga aggggaagac	600
caaattactg tttgggggtt ccattcggat aacaaaaccc aaatgaagtc cctctatgga	660
gactcaaatc ctcaaaagtt cacctcatct gctaattggag tgaccacaca ttatgtttct	720
caaattggcg acttcccaga tcaaacagaa gacggaggac taccacaaag cggcagaatt	780
gttgttgatt acatggtgca aaaacctggg aaaacaggaa caattgtcta tcaaaggggt	840
gttttgttgc ctcaaaaggt gtggtgcgcg agtggcagga gcaaagtaat aaaaggtca	900
ttgcctttaa ttggtgaagc agattgcctt catgaagaat acggtggatt aaacaaaagc	960
aagccttact acacaggaaa acatgcaaaa gccataggaa attgccaat atgggtaaaa	1020
acacctttga agcttgccaa tggaacaaa tatagacctc ctgcaaaaact attgaaggaa	1080
aggggtttct tcggagctat tgctggtttc ctagaaggag gatgggaagg aatgattgca	1140
ggttggcacg gatacacatc tcacggagca catggagtgg cagtggcggc agaccttaag	1200
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ctggatgaaa aagtggatga cctcagagct gacactataa gctcaciaat agaacttgca	1380
gtcttgcttt ccaacgaagg aataataaac agtgaagatg agcatctatt ggcaactgag	1440
agaaaactaa agaaaatgct ggggtccctc gctgtagaca taggaaacgg atgcttcgaa	1500
acaaaacaca aatgcaacca gacctgctta gacaggatag ctgctggcac ctttaatgca	1560
ggagaatatt ctctccccac ttttgactca ttgaacatta ctgctgcatc tttaaatgat	1620
gatggattgg ataaccatac tatactgctc tattactcaa ctgctgcttc tagtttggct	1680
gtaacattaa tgctagctat ttttattggt tatatggtct ccagagacaa cgtttcatgc	1740
tccatttgtc tataa	1755

<210> 57

<211> 1401

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of influenza B virus Nyam (B/Singapore/INFTT
16 0610/16 (By))

<400> 57

atgctacctt caactataca aacgttaacc ttattttctca cattaggggg agtgctatta	60
tcactatatg tgtcagcttc attgtcatac ttactatatt cggatatatt gctaaaattt	120
tcacgaacag aagtaactgc accaataatg ccattggatt gtgcaaacgc atcaaatgtc	180
caggctgtga atcgttctgc aacaaaaggg gtgacacctc ttctcccaga accggagtgg	240

acgtaccctc gtttatcttg cccgggctca acctttcaga aagcactcct aattagcccc	300
catagattcg gagaaaccaa aggaaactca gctcccttaa taataaggga accttttatt	360
gcttgtggac caaaggaatg caaacatttt gctctaaccc attatgcagc tcaaccaggg	420
ggatactaca atggaacaag agaagacaga aacaagctga ggcattctaatt ttcagtcaaa	480
ttgggcaaaa tccaacagt agaaaactct attttccaca tggcagcttg gagtgggtcc	540
gcatgccatg atggtagaga atggacttac atcggagttg atggcccaga cagtaatgca	600
ttgctcaaaa taaaatatgg agaagcatat actgacacat accattccta tgcaaaaaac	660
atcctaagga cacaagaaag tgcctgcaat tgcattcggg gagattgtta tctgatgata	720
actgatggcc cagcttcagg gattagttaa tgcagattcc ttaagattcg agagggccga	780
ataataaaag aaatatctcc aacaggaaga gtaaaacaca ctgaggaatg cacatgcgga	840
tttgccagca acaaaacat agaatgtgcc tgtagagata acagttacac agcaaaaaga	900
ccctttgtca aattaaatgt ggagaccgat acagcggaaa taagattgat gtgcacaaag	960
acttatttgg acacccccag accaaatgat ggaagcataa cagggccttg cgaatctgat	1020
ggaaacgaag ggggtggagg catcaaggga ggatttgttc accaaagaat ggcattccaag	1080
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gtaaagtatg atggagaccc atggactgac agtgaagccc ttgctcttag tggagtaatg	1200
gtttcaatgg gagaacctgg ttggtattcc tttggcttcg aaataaaaga taagaaatgt	1260
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gcggaacag ccatttactg tttaatgggc tcaggacaac tgctgtggga cactgtcaca	1380
ggtgttaata tgactctgta a	1401

<210> 58

<211> 3813

<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of SARS-CoV-2 spike (S) protein (RRAR?QQAA;
?69-70; ?Y144; N501Y; D614G)

<400> 58

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cgcacccagc tgccaccagc ctacacaaac agcttcacca gaggagtgtta ttaccctgat	120
aaggctcttta gatcctccgt cctgcattct acgcaggatc tcttcttgcc attcttcagc	180
aacgtgacat gggtccacgc catctctggc accaacggca caaagcgctt cgacaatcct	240
gtgttgccgt ttaacgacgg cgtttacttc gccagcacag aaaagagcaa catcatccgg	300
ggctggatct tcggcaccac cctggacagc aaaacccaaa gcctgctcat cgtgaacaac	360
gccaccaacg tgggtatcaa ggtgtgcgag ttccagttct gcaatgatcc ttttctgggc	420

gtgtatcaca agaacaacaa gagctggatg gaaagcgagt tcagagtgtg ttctagcgcc	480
aacaactgca cttttgagta cgtgtcccag ccctttctta tggacctgga aggcaagcag	540
ggcaacttca agaatctgag agaattctgt ttcaagaaca ttgatggcta cttcaagatc	600
tacagcaagc acacccttat caacctgggt cgggacctgc cacaaggctt cagcgccctg	660
gaacctctgg tggacctgcc tatcggcatc aacatcacac ggttccaaac cctgctggcc	720
ctgcaccgga gctacctgac ccccggcgac agcagcagcg gctggaccgc cggcgtgcc	780
gcctattacg tgggctacct gcaacctaga accttcctgc tgaaatacaa cgagaacggc	840
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aagtctttca ccgtggagaa gggcatctac cagaccagca acttcgggt gcagcctaca	960
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gccactcgggt tcgcctctgt ctacgcctgg aaccggaaac ggatctctaa ttgcgtggcc	1080
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cagttcggca gagacattgc cgacaccaca gatgctgtta gagacccca gacgctggaa	1740
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acaagcaacc aggtggctgt gctgtaccag ggcgtgaact gtacagaggt ccctgtggca	1860
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cagacaaggg ccggatgcct catcggcgct gagcacgtga acaattctta cgagtgcgac	1980
atccctattg gagcgggcat ctgcgccagc taccagacac agaccaatag ccctcagcaa	2040
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tctgtggcct acagcaacaa cagcatcgct atccctacca acttcacat ctctgtcacc	2160
accgaaatcc tgcccgtcag tatgacaaaa accagcgtcg actgcacat gtacatatgc	2220
ggcgatagca ccgaatgcag caacctgctg ctgcagtatg gtccttctg cacccaactt	2280
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<212> DNA

<213> Artificial Sequence

<220>

<223> Nucleotide sequence of SARS-CoV-2 spike (S) protein (RRAR to QQAA; Del242-244; K417N; E484K; N501Y; D614G)

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 <211> 3804
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<223> Nucleotide sequence of SARS-CoV-2 spike (S) protein (RRAR to QQA; del69-70; del242-244; K417N; E484K; N501Y; D614G)

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<212> DNA

<213> Artificial Sequence

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<223> Nucleotide sequence of SARS-CoV-2 spike (S) protein (RRAR toQQA; del69-70; delY144; N501Y; A570D; D614G; P680H; T716I)

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