What the Immune System Can Make and What the Body Holds Are Different Quantities, and Which Is Larger Turns on the Junctions

— Heavy chains give $V40 \times D25 \times J6 = 6000$ and light chains $V40 \times J5 = 200$, so the pairings number 1.200000×10^{6} — the separator is whether one counts the combinations or the stock in the body — [Paper 825]

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— *From thinking to syncing.* —

Abstract

The immune system is said to make almost unlimited kinds of antibody.This paper counts that the number it can make and the number the body holds are different quantities, and that which is larger flips on one representative value.No new theorem or law is claimed. First, multiplication does the work——6000 heavy chains and 200 light ones give 1.200000×10^{6} pairings, from only 116 parts in all (Section 2). **Second, that alone passes the gene count by orders of magnitude——it is 6.000000×10^{6} times the 2×10^{4} genes** (Section 2). **Third, and this is the core. Which is larger flips with the junctional diversity——at 10^{5}-fold the possible types number 1.200000×10^{11}, and the body's 10^{12} lymphocytes exceed them by 8.333333** (Section 3). **Fourth, the crossing is one number——above 8.333333×10^{5}-fold the body can no longer hold every possible type** (Section 3). **Fifth, the meaning of the immune claim changes across it——below it the body always holds every shape; above it, it draws them as needed** (Section 4). **Sixth, the separator is whether one counts the combinations or the stock in the body——one phrase, "many kinds", points at two different quantities** (Section 4). **Keywords**: immune diversity, combinations, junctions, lymphocytes, stock, representative values.

Scope of this paper (scope note): **No new theorem or law is claimed——that $V(D)J$ recombination generates diversity, that junctions add more, and the order of magnitude of lymphocyte numbers, are all known.The numbers are representative——the counts of V, D and J segments, the junctional factor, 2×10^{4} genes and 10^{12} lymphocytes all vary by species and source.No mechanism is claimed——the molecular machinery of recombination, somatic hypermutation and class switching are only named.Selection is not treated——removal of self-reactive cells and expansion on meeting an antigen are not included.Disease is not treated——immune deficiency and autoimmunity are not the subject.Relation to earlier papers**: **Paper 821 showed that braille grows the meanings without growing the shapes——this paper stands beside it: there shapes against meanings, here what can be made against what is held, both cases of two quantities being counted.Paper 163 showed that "a good code exists" and "here is a good code" are different sentences——"can be made" and "is held" are likewise different sentences.**What is added is **counting the pairings at 1.200000×10^{6}, measuring that 116 parts reach 6.000000×10^{6} times the gene count, locating the crossing at 8.333333×10^{5}-fold**, and **placing the separator on combinations versus stock**.

1. Notation and the Question

Setting: **an antibody is built from a heavy chain and a light chain, each assembled from segments.Heavy chains draw from V, D and J; light chains from V and J.**

$$N_{\text{heavy}} = V \cdot D \cdot J, \qquad N_{\text{light}} = V \cdot J, \qquad N_{\text{pairs}} = N_{\text{heavy}} \cdot N_{\text{light}}$$

Junctions add further diversity; write J_{junction} for that factor.

Question: **which is larger, what can be made or what the body holds?**

2. Built by Multiplication

Computation 2.1: **with representative counts $V40$, $D25$, $J6$ for heavy chains and $V40$, $J5$ for light ones.**

counted	value
heavy chains	6000
light chains	200
pairings	1.200000×10^{6}
parts in all	116
times the gene count	6.000000×10^{6}

Observation 2.2

there are only 116 parts.Multiplying them gives 1.200000×10^{6} pairings, 6.000000×10^{6} times the 2×10^{4} genes——the number of kinds is not the number of parts but the number of arrangements.

3. Junctions, and the Stock

Computation 3.1: **the junctional factor was varied and compared with the body's 10^{12} lymphocytes.**

junctional factor	possible types	against lymphocytes
10^{3}	1.200000×10^{9}	8.333333×10^{2}
10^{5}	1.200000×10^{11}	8.333333
10^{7}	1.200000×10^{13}	8.333333×10^{-2}
10^{9}	1.200000×10^{15}	8.333333×10^{-4}

Observation 3.2

this is the core. Which is larger flips with the junctional diversity.At 10^{5}-fold the lymphocytes exceed the types by 8.333333; at 10^{7}-fold the types win——the crossing is 8.333333×10^{5}-fold, which is the lymphocyte count divided by the pairings.

Observation 3.3

the meaning changes across the crossing.Below it the body holds every shape at all times; above it, what it holds is a small part of what it could make——"ready for any antigen" holds either way, with different content.

4. The Separator

Observation 4.1

the separator is whether one counts the combinations or the stock in the body.The first is fixed by multiplication, the second by the size of the body——one phrase points at two quantities.

Observation 4.2

placed beside Papers 821 and 163.Paper 821 showed braille growing meanings without growing shapes——here too two counts move independently.Paper 163 showed that "a good code exists" and "here is a good code" differ——"can be made" and "is held" differ in the same way.

Observation 4.3

what is not said.The molecular machinery, somatic hypermutation, selection and disease are not treated——what is shown is that the order of two counts flips on one representative value.

5. Census and Closing

1. **6000 heavy chains** (Computation 2.1): $V40 \times D25 \times J6$.
2. **200 light chains** (Computation 2.1): $V40 \times J5$.
3. 1.200000×10^{6} **pairings** (Computation 2.1): **the force of multiplication.**
4. **116 parts** (Observation 2.2): **arrangements, not parts.**
5. 6.000000×10^{6} **times the genes** (Computation 2.1): **past them by orders.**
6. 1.200000×10^{11} **at** 10^{5}**-fold** (Computation 3.1): **lymphocytes exceed by** 8.333333.

7. **1.200000×10^{13} at 10^{7}-fold** (Computation 3.1): **the order reverses.**
8. **crossing at 8.333333×10^{5}-fold** (Observation 3.2): **the core.**
9. **meaning changes across it** (Observation 3.3): **holding all, or drawing as needed.**
10. **combinations or stock** (Observation 4.1): **the separator; Papers 821, 163.**

Closing: **What the immune system can make and what the body holds are different quantities, and which is larger turns on the junctions.Heavy chains give 6000 and light ones 200, so the pairings number 1.200000×10^{6} from only 116 parts, 6.000000×10^{6} times the gene count——what does the work is the number of arrangements, not the number of parts.Taking junctional diversity as 10^{5}-fold makes the possible types 1.200000×10^{11}, fewer than the body's 10^{12} lymphocytes by 8.333333, while 10^{7}-fold reverses it; the crossing is 8.333333×10^{5}-fold——that number is the lymphocyte count divided by the pairings.Across it, "ready for any antigen" changes from holding every shape at all times to drawing them as needed.The separator is whether one counts the combinations or the stock in the body.Placed among the earlier papers——standing beside Paper 821's shapes against meanings, and using Paper 163's distinction between "exists" and "here it is".To be honest——every count is representative, and neither mechanism nor selection is treated.**

References

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